# ELECTRICAL REVIEW

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## Electric Light, Power, Telephone, Telegraph and Scientific Progress.

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# AT NIAGARA.

### THE NATIONAL ELECTRIC LIGHT ASSOCIATION ASSEMBLES.

### A Large Attendance and Several Excellent Displays.

THE BRUSH COMPANY'S VERY INTERESTING EXHIBIT.

[Special despatch to the ELECTRICAL REVIEW.]

NIAGARA FALLS, N. Y., Tuesday, Aug. 6.—To-day the Tenth Convention of the National Electric Light Association meets here in the Casino. The convention promises to be the best-working one ever held. The International Hotel is well filled with familiar faces, and a number of new ones are also to be seen. Chairman Rhodes has worked unceasingly, and has everything so well arranged that the convention will start off most auspiciously.

The special train from New York came through in fine style, arriving here last evening. Some 70 passengers were on board.

The Brush Electric Company, of Cleveland, has a fine exhibit placed on the lawn in front of the Casino. The largest electric motor in the world, it is claimed, is exhibited—150 horse-power. A duplicate of the power plant in the Calumet and Hecla mine is another interesting exhibit by this company.

This evening A. R. Foote's Committee on Legislation give a dinner at the hotel. The officers of the Association are invited.

The Falls will be a point of much interest—especially to the power men. Many of the members brought their wives, and the meeting promises to be unusually pleasant socially.

Chairman Rhodes gave a breakfast to officials and executive committee this morning.

I send the following hurried list of exhibitors:

Brush Electric Co., Cleveland, O., large generator and motor, transmitting 100 horse-power, 1,500 feet; 600-light new style alternating incandescent dynamo; all in operation.

Excelsior Electric Co., New York, 10 horse-power motor on arc circuit; this runs an incandescent dynamo, which in turn generates power for a three horse-power incandescent motor.

Bernstein Electric Co., Boston, Mass., incandescent lamps on arc circuit.

Thomson Welding Co., Boston, Mass., 25 horse-power dynamo and welding machines in operation.

Eddy Electric Mfg. Co., motors, etc.

"C. & C." Motor Co., arc and incandescent motors.

Western Electric Co., New York and Chicago.

Weston Electrical Instrument Co., Newark, N. J.

James W. Queen & Co., Philadelphia, Pa., electrical measuring instruments.

C. McIntyre & Co., patent wire joints.

Fairbanks & Co., New York, insulation and valves.

A. R. Foote, Cincinnati, O., books.

Standard Carbon Co., Cleveland, O.

Non-Magnetic Watch Co., New York.

Ellis Lubricating Co., Boston, Mass.

Phonograph and Phonograph-Graphophone.

American Indurated Fibre Co., New York, indurated fibre pipe.

F. E. Prichard, Cedar Falls, Iowa, electric governors.

C. A. Schieren & Co., New York, belting.

American Leather Link Belt Co., New York.

Bickford & Francis, Buffalo, belting.

### Something for Business Men.

The electric date and time stamp is the latest thing in the way of electric inventions. It may be attached to any clock, and, in connection with a battery, it will record the exact time of the day to the minute and also the day of the month. There is no kind of office business in which this instrument will not be useful as a time and labor saver, and valuable as a protection against mistakes, disputes and impositions. It may be used to date correspondence without the trouble of referring to a calendar; also to record the time letters or telegrams are received and answered, the time orders are received and filed, goods shipped, or bills paid; also for recording the time employés start and leave off work, and registering the time watchmen visit the different parts of an establishment, etc. It is operated automatically in synchronism with any clock by means of an electric battery and circuit-closer attached to the clock. In addition to the date the stamp may be made to give also the name and business address of the owner, or any other words desired, such as "received," "filed," "canceled," etc.

### An Aid to the Surgeon.

A London physician has lately been using electricity in the treatment of cancer, and he thinks that by the means of that agency the terrible disease can be brought to a standstill. The report which reached us of the cases in which he has applied it are not very comprehensive, but it appears that the cancerous growths remained quiescent for from 3½ to six months. The cancers do not disappear altogether, but remain as inert masses. Of course it will take a long time to prove the full value of electricity in this disease, but the results obtained by its use thus far are certainly encouraging.

### Electric Distribution of Power in the Factory of the Globe Tobacco Company, at Detroit, Mich.

This electric plant was designed as a substitute for the long lines of shafting and connecting belts through the floors, that would have been necessary for the distribution of power from the engine in the basement to the machinery through the seven story building.

The plant consists of an Edison dynamo of 50,000 watts capacity, delivering current at 225 volts pressure at normal speed. A dynamo with a capacity much in excess of the present needs of the factory was selected in order to meet future demands in this or neighboring factories.

The current is at present furnished for seven Eddy electric motors in different parts of the building, of from one h. p. to 15 h. p. capacity, each driving its own machinery entirely independent of all the rest. These seven motors aggregate 42 h. p., and are nearly all working up to their full capacity, but, owing to the intermittent character of the work, the total current drawn from the dynamo never exceeds 20 h. p., and averages very much less. The manager of this company estimated, from former experience, that it would require about 20 h. p. to drive the shafting that would be necessary to connect the machinery, now driven directly by the motors, with the engine in the building. As this would have been a constant consumption of power, whether the machines were at work or idle, the results obtained are in comparison very satisfactory.

The dynamo also furnishes current for

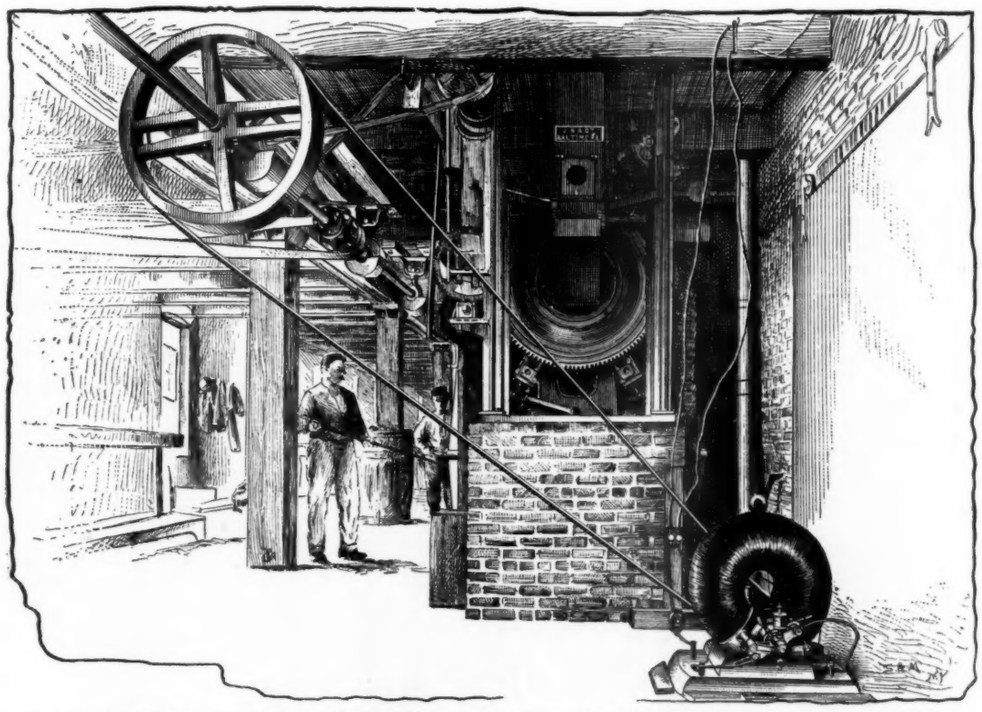

FIG. 1.—THE EDDY ELECTRIC MOTOR (TEN HORSE POWER), RUNNING DRYERS AND CUTTING MACHINE IN THE GLOBE TOBACCO WORKS, DETROIT, MICH.

### An Electric Beach Road.

The new rapid transit line from Crescent Beach to Winthrop Junction, Revere, Mass., equipped with the Thomson-Houston system, has just been put in operation. Owing to the nature of the soil, the roadbed has been mainly placed on piling, and there is one stretch of bridge work of 2,400 feet. The entire length of the line is about two miles of double track. It has been constructed in the most thorough and reliable manner, and is heavy enough to sustain ordinary steam traffic, and is of standard gauge, four feet eight and one-half inches, and laid with 56-pound steel T rail. The equipment of the road, which, so far as the cars are concerned, is a summer one, consists of 14 open cars, six of which are motor cars, the design being to run two or three cars in a train with motors.

lighting the building, the lamps being wired in pairs, in series. The dynamo switch board is connected by underground mains with the station of the Edison Illuminating Co., and the entire factory can be run with the current from that station, or the factory-dynamo can be used to assist the central station dynamos in this district during the months when the lighting laps the heavy motor load now carried by this station.

The motors are, with one exception, on platforms hung from the ceiling, using no floor space.

This plant was planned and installed by the Edison Illuminating Company, of Detroit, through their manager, C. P. Gilbert, and it now represents a successful application of electric distribution of power in factory work.

The Eddy motor was selected after a careful examination of the merits of the motors now in use, and the results are very satisfactory to the Globe people.

### The Boston Electric Railway.

President Whitney, of the West End Electric Railway Company, Boston, recently delivered an interesting address, which not only contains much valuable information, but shows Mr. Whitney to be a thorough convert to electric power. A few paragraphs from his address are given below:

"On the 6th day of July last the road from Harvard Square to Arlington was opened for travel by the electric cars. The time from Arlington to Harvard Square, which was certainly the quickest time that has been made from time immemorial before, or which it has ever been possible to make, was 35 minutes. The schedule time to-day is 20 minutes. We make on that avenue only occasional stops, and I have heard but one expression of opinion in regard to that whole system, and that is of the heartiest approval of the whole thing. So that the company now comes before these stockholders and the community in this position, that it and the community are satisfied that this electric system is the system that will accommodate the people; and it is, furthermore, a system that is so much cheaper in its operations that it is advisable by all means for the company to put it in at the earliest possible day. * * *

"Many of you, if not all of you, are aware that the company have recently made a purchase of the property of the Hinckley locomotive works for its power station. Now, the real electrical center of this whole city, inside of Charles river, is at the corner of Pleasant street and Shawmut avenue. We are even now very near the electrical center, from that point. As the travel increases to the southward and westward or in the Highland district, the electrical center will move north until, in a very short time, it will be almost on a line with this property. We studied the problem very closely, and there is not a place in this city so well adapted for the purposes of running this whole electrical system as the very spot we have secured. And it is possible, from this spot, simply by adding engines and boilers and dynamos, and a similar duplication of the parts, to run every car inside of Charles river, including South Boston, from now on, for the next 10, 15, and I do not know but 25 years to come. If the company should feel that it was safe to place its entire plant upon that property and depend upon its feeding lines to operate the cars, all over that point, there is property located, as well as any property in this city could be located, for the operation of all these cars inside the Charles river from now on for the next quarter of a century.

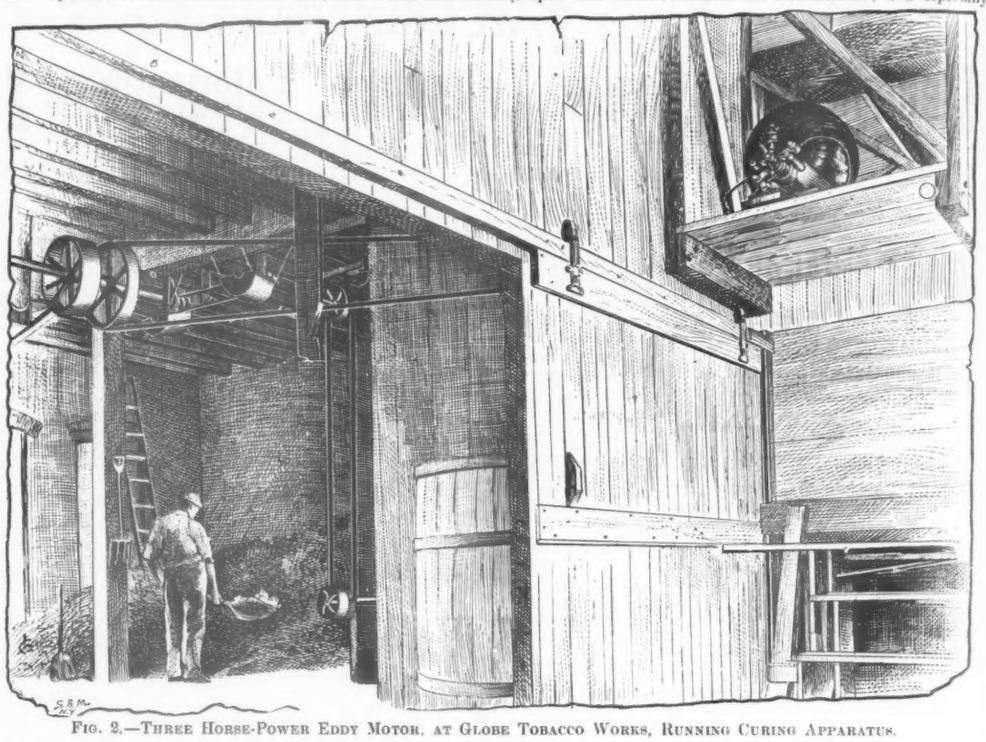

FIG. 2.—THREE HORSE-POWER EDDY MOTOR, AT GLOBE TOBACCO WORKS, RUNNING CURING APPARATUS.

"So that, in making this departure, we are making a departure which, so far as that particular property is concerned, ends the matter for years to come. It is a question which every one of you gentlemen, stockholders of this company, will realize the force of. And if we should hereafter come to you and ask for further capital for the location of another power house in some other station, you will understand the reason why, and that is this: Doing so large a business as we do, serving so large a community as we do, whether it is safe and proper for us to depend altogether upon the location of the power house in one district. We believe that for the present it is sufficient.

"The operation of these cars will involve, at no distant day, the furnishing of 10,000 horse power. Every one familiar with mechanics will know that the cost of putting in horse power, that the cost of putting in a large plant is about $100 per horse power, and every man can estimate for himself about what it shall be in that proportion. I do not suppose that we shall need all this sum at once. But we propose laying out these works and entering upon this whole business upon a comprehensive plan. And for the purposes the stock is issued we have a right, as fast as it is necessary, to make these expenditures.

"Then, as to the motors. A good motor, a good double motor such as we are using, will cost about $3,000, and a single motor $2,000. And it depends entirely upon the number of cars we equip as to the number of motors that we shall want. We are to-day running between 700 and 800 cars. And if the experience of our travel since the use of the electrical cars were introduced is any criterion, we shall not only want that, but an immense number more almost immediately. There, you can see, is another $1,500,000 or $2,000,000.

"Then the wiring and the poles and all that sort of thing will cost from $5,000 to $6,000 a month. There is another $1,000,000.

"Then there is the new construction, the equipments, new track, which will involve, perhaps, another $1,000,000. And that is the $4,500,000 which we must issue to make this change.

"Now, then, a word as to the cost of operating, for that is a question that largely concerns the stockholders; and especially with reference to the increase of stock. The average cost of motive power by the horses for the last six months is 10.16 cents a mile. That does not include anything that is not properly chargeable to the use of horse-power. It does not include even all the insurance on the stables. And as careful a revision as it was possible to make has been made of the average cost of running by horse-power, and it is found to be, as I said, 10.16 cents a mile. That, the gentlemen will understand, does not include the expense of drivers, conductors, starters, repairers of track, and all these various things.

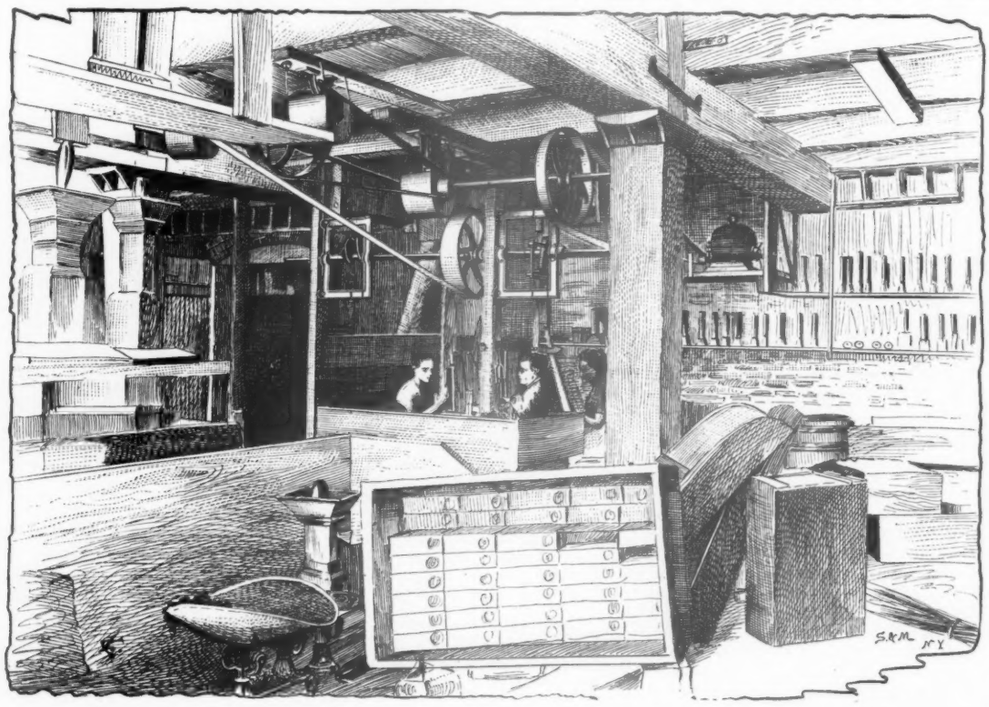

FIG. 3.—ONE HORSE-POWER EDDY MOTOR AT GLOBE TOBACCO WORKS, RUNNING PACKING MACHINERY.

"These are all eliminated That is directly chargeable to the cost of running the road by horses; that is, the cost of horse motive power. Well, now, from our experience in the actual operations of our electric road from Allston, the cost of the fuel required is only 1¼ cents. Now, the directors believe that the cost of furnishing power, including engineering, and, I will say, including engineers and all other expenses, has been a trifle over three cents a mile. The reason that the cost of the engineers and so on is in so large a proportion is due to the fact that the mileage is so small; that over that line now, even, but few cars are operated, and the expense during that time is chargeable to that.

"And it includes running the cars and conduit and everything from the time we started until this time. So that the directors believe that the cost of power of operating, including engineers and every expense at the power house will not exceed two and a half cents a mile. And it is believed by the engineers that the expense will be very much less than that. Well, now comes the taking care of the motors. The company does not estimate the cost of taking care of the motors and of the other expenses of the overhead line as exceeding 2½ cents a mile more. There is a clear saving of five cents a mile. Then there is still a further saving made in the operation of the road by the increase of speed which we can make, which anybody can figure for himself. We have not had experience enough to tell exactly what it may be, but that it is an important factor in determining the cost of transporting these people is absolutely certain.

"What does this all mean? It all means this, that, with this electric system put in, we are in a position to give the community what it needs in the way of rapid transit. We are in the position to give it what it needs in the way of greater accommodations, more and more frequent cars. And all these things take money. If we were to stop and stand still, we should not require a single cent, but it would be an exceedingly unfortunate position for the company or the community."

### The Electric Road at Topeka.

A correspondent at Topeka, Kansas, writing to the REVIEW about the electric road (Thomson-Houston system) which was completed a few months ago, says:

"Our electric road is a daisy. We have over 16 miles of track and expect to have 18 by November 1st. There has not been a stoppage of ten minutes on account of any electrical defect. One night, when there was something special going on at Oakland, over three miles from the plant, there were 20 motor cars and 8 tow cars at that point as close as they could be run safely, all loaded to the last step, and they moved off as smoothly and steady as if there had been but one. So far there has been only one objection to these cars discovered, and that is, at night when they are lighted, all the bugs in the county make a bee line for the cars and keep the passengers busy brushing them off. This frequently leads to the turning out of the lights, which meets with great favor with the boys out with their girls." S.

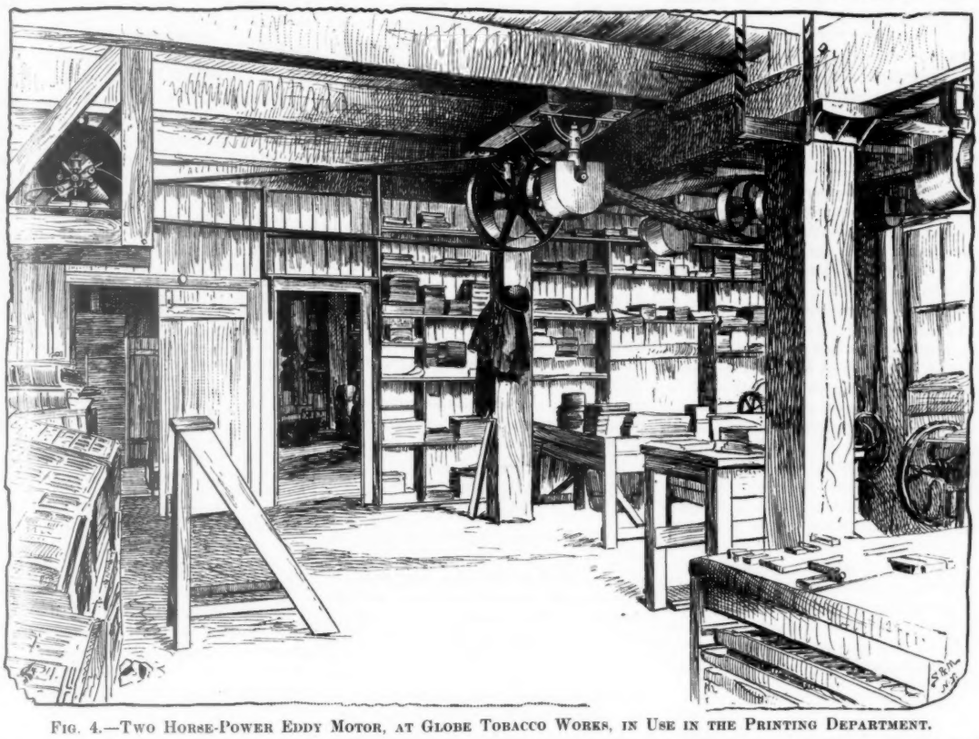

FIG. 4.—TWO HORSE-POWER EDDY MOTOR, AT GLOBE TOBACCO WORKS, IN USE IN THE PRINTING DEPARTMENT.

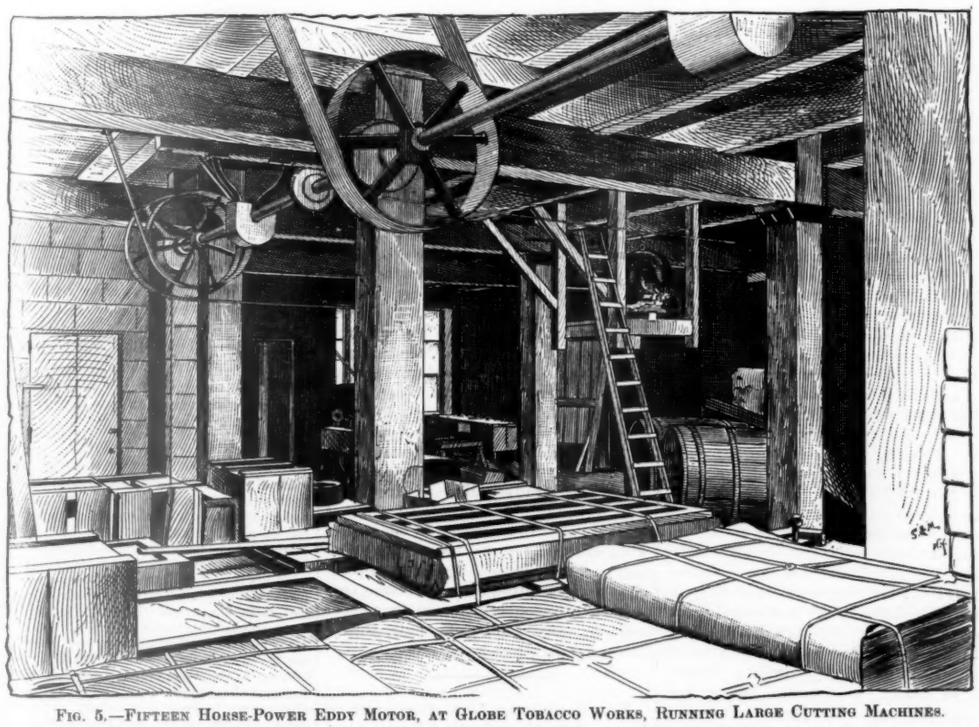

FIG. 5.—FIFTEEN HORSE-POWER EDDY MOTOR, AT GLOBE TOBACCO WORKS, RUNNING LARGE CUTTING MACHINES.

**Albany, N. Y.**—The Electric Gas Machine Company has been incorporated with a capital of $200,000, divided in $50 shares. The principal office is in Castleton, Rensselaer county. The incorporators are James W. Tallmadge, of Boston; John W. McKnight, William A. Brown, Ephraim K. Bradbury, Wm. W. Wood, of Castleton, and James Purcell, of Valatie.

**Charleston, W. Va.**—The Charleston Electric, Heat, Light and Power Company; its purpose is operating stations to furnish Charleston electric power for motors, light or heat, lighting towers, constructing and maintaining lines for the transmission of electricity for heat, light or power, and the corporation is to expire January 1, 1939. For the purpose of forming said corporation the sum of $250 has been subscribed, $25 of which has been paid in. The privilege of increasing the capital stock to $200,000 in all is reserved. Shares are $25 each, and are held by F. P. Jepson, Allen Bruck, J. A. H. Adams and F. P. McNeil, all of this city, and C. P. Snyder, of Charleston.

**Albany, Ore.**—The Albany Electric Light and Power Company filed articles of incorporation recently with the secretary of state; principal place of business, Albany; capital stock, $30,000. Incorporators: N. H. Allen, D. P. Mason and George E. Chamberlain.

**Winthrop, Mass.**—Elliott Wood, A. H. Bailey, C. D. Wood and L. T. Carlton, have associated themselves together for the purpose of establishing an electric light plant here. It is the intention to form a joint stock company with a capital stock of $10,000, each share being placed at $50; $2,000 have already been pledged.

**Elgin, Ill.**—Elgin Rapid Transit Company of Elgin; for constructing, maintaining, and operating horse and dummy railroads, to be operated by horse, cable, electrical, or any other practical motive power; to furnish, lease and sell power, light and heat; capital stock, $150,000; incorporators, Howard E. Perry, James McM. Smith, and Azel F. Hatch.

**Columbus, O.**—The Whitney Electric Manufacturing Company, of Columbus; capital stock, $50,000.

**Sterling, Ill.**—The Union Street Railway Company, of Sterling and Rock Falls, filed a certificate of increase of capital stock from $35,000 to $125,000.

**Chicago, Ill.**—Sperry Motor Company, at Chicago; to manufacture electrical motors; capital stock, $50,000; incorporators, Elmer A. Sperry, David T. Foley, William R. Goodman.

**Chicago, Ill.**—Midland Manufacturing Company, Chicago; to manufacture street railway cars and equipments; capital, $100,000; incorporators, Noble B. Judah, Munroe L. Willard, Henry M. Wolf, J. Wolf.

**Plymouth, Ind.**—The M. W. Simons Electric Company, of Plymouth; capital stock, $25,000; Millard W. Simons, Perry A. Randall, Orlando M. Packard, Albertus C. Caprin and Renald T. McDonald, directors.

**Chicago, Ill.**—Chicago & Arkansas Railway Construction Company, at Chicago, for the construction of railways and telegraph lines; capital, $325,000. Incorporators: G. M. Barbour, Adolph Cudell and F. C. Rulan.

**Savannah, Ga.**—The Mutual Electric Light Company has been organized by H. Blum, D. Douglass and B. A. Denmark, of Savannah, and Randall Morgan, S. T. Bodine and A. C. Humphreys, of Philadelphia. Capital stock, $50,000.

**Omaha, Neb.**—The Nebraska City Water and Light Company have filed articles of incorporation with the county clerk, with a capital stock of $375,000. The new company is the re-organization of the old water company on a more extensive basis.

**Camden, N. J.**—The Electric Power Company; the incorporators are W. J. Coite, of Haddonfield; George W. Boileau, Robert B. Essler, Lynn C. Troutman and W. E. Parrish, of Philadelphia; Knight Meftel, of New York, and F. B. Pfeiffer, of Camden. The capital stock is $150,000. The objects of the corporation are to manufacture and distribute, sell and lease electric power and conduits.

**New Bedford, Mass.**—The following officers of the Middleboro Electric Light and Power Company have been chosen: President, W. A. Styles; clerk, Nathaniel P. Sherman; treasurer, W. F. Pope; directors, W. A. Styles, George L. Soule, Nathaniel B. Sherman, Edward O. Parker, Nathaniel P. Sherman. The electric plant of the company is said to be one of the most complete in the State.

**Oakland, Cal.**—Oakland and Berkeley Rapid Transit Company. The capital stock is $250,000, in 2,500 shares of $100 each. The sum of $14,000 is actually subscribed. The object is to operate a railroad by electricity, or a cable road. The directors are F. K. Shattuck, J. W. Coleman, A. J. Snyder, J. E. McElrath, James McGee, V. D. Moody, James Gamble, G. W. McNear, A. T. Eastland, Louis Gottshall. The president is F. K. Shattuck, and V. D. Moody, treasurer.

**Denver, Col.**—Articles of incorporation of the Denver Electric Railway Construction Company have been filed with the secretary of state. The incorporators are John J. Riethmann, Jr., J. A. Brown, Charles F. Musgrove, Frank Evans and George W. Briggs. Capital stock, $300,000. Limited to 20 years. The purpose of the new company are the construction of electric railways and the manufacturing of all appurtenances thereto. The incorporation of this company is the commencement of the scheme to build a system of electric roads as feeders to the tramway company's cables. The system to be used will be the Thomson-Houston.

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## EDITORIAL ANNOUNCEMENT

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☞ No attention will be paid to communications without the *name and address of the writer.*

*We invite correspondence from Electricians, Inventors, and the Telegragh and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.*

*We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.*

*Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.*

**NEW YORK, AUG. 10, 1889.**


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### *SPECIAL MEETING OF THE ELECTRIC CLUB.*

The following notice of a special meeting of the Electric Club, in response to a call signed by over 10 per cent. of the resident members, has been sent out by the secretary of the Club:

"In accordance with Article VII. of the Club's By-Laws, a special meeting of the voting members of the Electric Club is hereby called for Friday afternoon, at 3 o'clock sharp, August 9th, 1889, to take action in the matter of submitting names of representative electrical men, for appointment on the Committees of the International Exposition of 1892, to Mayor Grant, of New York, who has been empowered to make such appointments by the Citizens' meeting of July 25th. Please be present promptly at the hour named."

New York, July 31st, 1889.

Passenger elevators having electric motors are much in use in England, the bank of England being the last to utilize their electric plant for such a purpose.

This week at Niagara Falls promises to be potent with good work for the electric lighting interests. The REVIEW will present its usual interesting report of the proceedings in its next issue.

The REVIEW tends a sincere welcome to the electric light and power advocates who visit New York State this week. We hope that many of them will be able to pay the Metropolis and the REVIEW a visit before returning home.

One of the Sunday papers, in a description of Sing Sing scenes, gives a pen picture of William E. Howard, the electric sugar refining fraud. He is engaged in the elevating occupation of rag picking, which he is liable to follow for some time.

No more enthusiastic adherent of electric street railways can be found than President Whitney of the West End road in Boston, and when his position at the head of the largest street railway system in the country—and one on parts of which electricity has been given a long and practical trial—is considered, his testimony has much weight.

Some vague dreamers have at times prophesied the eventual control of the weather by electrical agencies. The past two weeks would have afforded an excellent opportunity for an exhibition of their skill, and if they had succeeded and averted the delightful weather we have been "enjoying," the thanks of the nation and a popular subscription amounting to thousands would have been theirs.

A final decree has been rendered by Judge Blodgett in the Federal Court, Chicago, Ill., in the long-pending litigation between the Bell and Cushman Telephone Companies. The Bell Company brought two suits against the Cushman Company for infringement of patent. The decree in both suits is against the Cushman Company. A fine of one dollar is assessed against it, and it is ordered to turn over all of its telephones to the Bell company.

The Chicago Telephone Company, at Chicago, Ill., is working now with the end in view of putting in what is known as a metallic circuit. The advantage of this system is that no noises are carried to the ears of the one using the 'phone. There is none of the rattling that is now so troublesome, and conversation cannot be interrupted by outside parties. The wires are insulated. It will be a long time before the system is put in operation, but the company says that all new wires are being laid with that end in view, and that they are working toward it as rapidly as possible. Before the change can be made, however, all the regular wires now in use will have to be replaced.

The latest scheme for the utilization of some of the water-power of Niagara Falls is reported to be hatching down in Alexandria, Virginia. The company which is working at it has the comprehensive name, the Niagara Hydraulic Electric Company, and claims to have permission from the Ontario Government for the right to use the water at the Horseshoe Falls on the Canadian side. The plan is said to be that of tunnelling through the rocks to the bed of the river, thereby obviating danger from ice and wreckage, and leaving undisturbed the beauty of the scenery. The power it is proposed to distribute electrically within a territory of 40 miles, for lighting, heating and power purposes. The present convention will afford an excellent opportunity for electricians from far and wide to ponder on the problem of how best to accomplish the harnessing of some of Niagara's wondrous power, and putting it to practical service. Something of the sort will probably come in the near future. Electricity will naturally play the important part.

### *ABLE AND REPRESENTATIVE MEN CALLED FOR.*

A meeting of the Electric Club has been called for the purpose of considering the International Exposition of 1892. This is wise and timely action, and we hope to see the meeting this week result in a strong endorsement of the Exposition idea and in favor of New York City as the place to hold it. Great care should prevail in all circles in selecting representatives for the Exposition committees. Men of prominence and standing in their different lines of work are needed. No industry should be permitted to excel the electrical in the quality of its representation. Much will be expected from this progressive and rapidly developing industry, and we expect to see it take highest rank at the Exposition of 1892.

The men of this city who have been in electrical work since it became an industry, the men acquainted with its history, its various branches and who realize its growing importance, should attend the meeting this week, and, taking wise counsel together, see that men who are in fact representative, whose names would lend strength, dignity and influence to the cause, and who would be a credit to the organization that named them, are suggested for the committees that the Mayor has been empowered to appoint.

### *E. G. ACHESON'S NEW CALELECTRIC GENERATOR.*

Three patents have just been issued to Mr. E. G. Acheson, of Pittsburgh, which give promise of at last achieving something substantial in the direct conversion of heat into electricity. One patent is to the method, one to the apparatus, and the third to a modified apparatus. In one of the first issues of the REVIEW in 1889 we described the same inventor's former apparatus, wherein he caused heat lines to traverse an electric conductor and produce a magnetic whirl cutting said lines, so converting the heat energy into electric energy.

Mr. Acheson now brings forward an invention which is somewhat different. He shows it both with and without a thermo-couple of the ordinary form; but the presence of the thermo-couple does not, to our mind, appear to add to the results except in the ordinary way. By means of an alternating current generator in a circuit which he prefers to inclose an iron core of the ring-type, he produces magnetic waves, and these by induction impress an E. M. F. in a secondary circuit wound upon the same core; the apparatus thus far practically constituting a transformer. He then applies flame or other source of heat to the *iron core* at a point devoid of winding, and by some process, not clearly set forth in the patents, an additional E. M. F. is impressed upon the secondary circuit. This additional E. M. F., in the practical experiments which the writer had the pleasure of witnessing, can and does exceed the E. M. F. impressed by the primary alternating current; so that in reality the electric energy due to the inductive transformation can be doubled by the action of his new thermic transformer.

The invention seems to be a distinct advance in electrical development, and opens up a new field for the investigator. The announced results are too remarkable not to attract widespread attention and experimenting everywhere. The practical bearing of the invention will be grasped by our readers when we say that, if the *Acheson effect* (if we may so christen it) is a reality, its application to existing plants of the alternating type would at once double their capacity without requiring any additional engine-power! This is a thing worth investigation.

With the Electric Light Convention at Niagara Falls this week; the Edison Convention at the same place the week following; the Telephone Convention the first of September, and the Electrical Exposition at St. Louis during September and October, electrical workers may be said to be fairly active without counting the regular business that engages them at all times.

### *THE CLAM BAKE.*

The invitations to the Rhode Island clam dinner of Mr. Eugene Phillips, president of the American Electrical Works, Providence, have been issued. This will be the eleventh annual clam bake given by the hospitable Mr. Phillips, and the happy recipients of invitations are anticipating a delightful day at the beautiful "*Vue de L'eau*" Club where the event will occur.

### *SECURE YOUR ACCOMMODATION FOR MINNEAPOLIS.*

Secretary Barney, of the National Telephone Exchange Association, makes the following announcement concerning the special train that it is proposed to run to the annual telephone convention at Minneapolis, the first of next month:

Orders for tickets and sleeping accommodations on proposed special vestibule train from New York to Minneapolis, have come in with quite gratifying promptness. Two car-loads are booked already, but one more remains to be secured. There are, however, a number of companies that will undoubtedly send delegates which have not yet responded. It should be borne in mind that a certain number of passengers must be guaranteed in order to secure this train, which is warranted to be the finest ever run out of New York City, as all the cars will be entirely new and of the latest construction. The executive committee are not in a position to assume any responsibility in this matter, and can only act upon the number of orders received.

### *DEATH OF THE MAN WHO KNEW HOW TO MAKE ALUMINUM FROM CLAY.*

The manager of the American Aluminum Company, Fred. J. Seymour, died at Findlay, Ohio, last week, and the secret of making aluminum is said to have died with him. He was the inventor of processes by which this valuable metal could be profitably extracted from common clay, and had put his inventions into practical use. About four years ago, as the result of years of experiments, F. J. Seymour, then a citizen of Detroit, secured patents covering processes for the manufacturing of aluminum. He had little difficulty in inducing capital to take hold of the enterprise, and the American Aluminum Company was organized, with Gen. Russell A. Alger as president and Senator Palmer, of Michigan, as vice-president. The discovery of natural gas in Findlay caused the location of the laboratories there. Expensive retorts and valuable machinery were constructed, and the manufacture was begun on a large scale, and proved so successful that large quantities of the metal were placed upon the market at a large profit on the investment.

The process, although patented in nearly all of its points, has been kept a religious secret, says a correspondent, and no one has ever been permitted to penetrate the mysteries surrounding it. A 15-foot picket fence surrounds the buildings, with its gates doubly padlocked. From remarks made by the chemists and other employés at different times, it is gathered that the clay, after being ground in water and treated with various chemicals, is treated to a heat of 1,500° in large retorts, until it has become thoroughly fused. When it has reached the crowning temperature, the precious metal is separated from the mass by the addition of a certain chemical in specific quantities, but the name and nature of this chemical is not disclosed in the letters patent, nor has any one employed about the works ever discovered it. It is this secret that has gone down into the grave with F. J. Seymour. It had been his invariable custom to await the critical moment when the fluid mass had reached the right stage, and then all the employés were excluded from the room, the doors were locked, and all alone he went through the mysterious processes of the laboratory, adding a chemical that no one knows the name of, has never seen, and in quantities that cannot be even guessed at. His death came as the result of a paralytic stroke, from which he never recovered consciousness, so that on his deathbed he had no opportunity of revealing the all-important secret. The stockholders of the company are undetermined what to do under the peculiar circumstances in which they are placed, but will probably give some of their chemists full scope to endeavor to rediscover the lost secret.

# ELECTRICAL NEWS.

## Boston, Chicago and Other Points.

### OUR CHICAGO LETTER.

The dedicatory reception of the Chicago Electric Club on Thursday evening was a grandly beautiful affair. The committees worked faithfully, and the whole went off as a vessel goes off the ways at a launch, with a jolly rush and hurrah. The mayor of Chicago honored the Club by not only coming, but by responding to the toast assigned to him, "Our lady members."

Chief Marshall Swenie, of the fire department, came, and with his wife spent the evening, and away up into the morning hours, with us, and Prof. Barrett with his daughter came and sat up with the Club, and there were those who sat at the tables and enjoyed the hospitalities of the Club, 200 happy guests. The phonograph proved a source of amusement and astonishment to very many, both ladies and gentlemen, who have yet to learn just how the blessed thing does it, although it was abundantly explained by all the learned professors in the Club.

There was a mandolin orchestra here, a quartette there, and a string band in another place, all assisting the Club and its friends to be gay, and the introduction committee and the committe on seats, and—well all of them—were as busy as the Devil in a gale of wind.

The *menu* was simply splendid, from an artistic, as well as an epicurian standpoint, and it had ample justice done it. Time was not stinted, and the discussion was elaborate enough to require two hours in the argument. Then there was a fine ballroom programme, and that class whose feet will not keep quiet when "music 's goin' on," were made happier, if possible, than before.

The billiard and pool room was well filled with lovers of that sport, and the cheerful click of the balls went on until Joe's eyes stuck out like a crawfish's, and he could hardly tell a chunk of chalk from a tumbler. To individualize would be superfluous, but everybody was happy and good, and the ladies, God bless 'em, over half a hundred in number, like flowers in a bouquet of ferns and dried grasses, enlivened the scene like brilliants and gems in a kaleidescope.

Decorations?—yes. Bronzes and plaques, and an oil painting from brother Giles, of the magnetic shield fame, and flowers and vases, and smilax, till the whole was a maze of floral beauty and the air was redolent with the perfumes of a thousand flowers.

There were chess and checkers, but no players. There were card tables and cards, but no one enjoyed them, for there was plenty enough to do, and all were anxious to move around and among the beautiful rooms, hold converse with the guests, and express their congratulations.

The opening night of the Chicago Electrical Club will be long remembered by those who were fortunate enough to be present on that happy occasion. C. C. H.

Chicago, August 3, 1889.

### OUR BOSTON LETTER.

**Work of the Wright Engineering Company.**—The progress and success of the Wright Electrical Engineering Company, organized in this city but little over six months ago, has been one of the features of the electrical business in this section. The company, under the direction of Mr. Alex. P. Wright, has been steadily gaining in business and enlarging its facilities to the present time, when it presents a well equipped and thoroughly competent force for the prosecution of electrical installations of all kinds. A large construction gang was sent early in the week to Woburn, Mass., where the Wright Company is installing a new plant requiring 1,200 poles, 40 miles of "P. & B." wire, with 219 Bernstein lamps and fixtures. The company is also engaged in rearranging the old circuits in the city.

**Some Tangible Testimony.**—On all sides, the growth of the electrical business, and increase of electrical enterprises, is a topic of conversation and an ever ready subject for the paragrapher, until one almost tires of hearing of it, but when tangible figures are given an interest is awakened and the subject is seen in a new light. Wherever electricity plays a part, wire is a necessity, and the more the electricity the more the wire and *vice-versa*—the more the wire the more the electricity. Dr. A. F. Mason, of the Simplex Company, gave me some interesting facts last week regarding the business of his company in supplying Simplex wire. The business of the company in July, 1888, was five times as large as the business of the corresponding month in 1887, and last July, 1889, the volume of business was 5¾ times as great as in July, 1888. Figuring this out shows that in July, 1889, the business was 28¾ times as large as that of the corresponding month two years ago.

**Reception by the Salem Electric Lighting Company.**—The Salem Electric Lighting Company, of which Mr. Charles H. Price is president, Mr. Henry M. Batchelder, treasurer, and Mr. Arthur S. Temple, general manager, has issued invitations for a reception at, and inspection of, the new station of the company on Thursday evening, August 8. The elegant new station will be open for inspection from 7 until 10 o'clock.

**New Station for Natick.** — The Natick Electric Light Company's increasing business has outgrown the present plant, and a new station of sufficient capacity to meet all demands will at once be erected on land recently purchased for the purpose. The new station will be of brick, one story high, and will contain the latest improvements in arrangements and fittings.

**Professor Thomson's Return.**—Professor Elihu Thomson has returned from his trip abroad, and was given a reception and dinner at Young's Hotel on Saturday evening by the Thomson Scientific Club, of Lynn, of which Professor Thomson is president.

**Both Want Locations.**—The Salem aldermen are just now torn by conflicting emotions, the cause being the petitions of the Naumkeag Street Railway Company and of the Essex Electric Street Railway Company, both of which ask for locations for electric lines through Mason street in that city. The Naumkeag road purposes using the overhead wire and single trolley system, while the Essex Company are earnest adherents of the storage battery system, which they will install if given the permission. A hearing was given both companies Thursday evening, at which Mr. H. P. Moulton appeared for the Naumkeag people, and Hon. W. D. Northend for the Essex Company, but no decision was given out.

**Off for the Convention.**—A goodly number of Boston and New England delegates to the Niagara Convention are to leave via the Fitchburg Railroad and Hoosac Tunnel route this afternoon. Two cars will probably be necessary for the party which is under charge of Col. C. M. Ransom.

**Brief Mention.**—Mr. A. D. Claflin, of the firm of Claflin & Kimball, New England agents for the Mather Company, is taking a well earned vacation, after a prosperous season.—The regular monthly meeting of the Electric Club will be held at the Park street rooms this evening.—Mr. John I. Drake, of Providence, who is now devoting his attention entirely to the Russell Mast Arm, was a Boston visitor last week, accompanied by Mr. S. R. Payson, consulting electrician, of Providence.—The Edison Phonograph Toy Manufacturing Company has begun the manufacture of talking dolls and expects to turn out 500 a day by Sept. 1.—Track is being laid for the new electric road between Plainville and North Attleboro, Mass.—The Quincy and Boston Electric Railway Co. has contracted with the Quincy Electric Light and Power Company for current for the electric cars which will be running, it is expected, in a week or two. The Quincy Light and Power Company has also made a contract with the city for 86 arc lights for the ensuing year.

Boston, August 5th, 1889. T. W. S.

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The Jersey City and Bergen Railroad Company, N. J., will introduce electric motors to take the place of horse-power.

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W. U. Telegraph Co.'s receipts for week ending July 13 were $234,582 against $222,997 for week ending July 14, 1888, an increase of $11,585. Receipts for week ending July 16, 1887, were $188,069, which makes same week of 1889 show an increase of $46,513 over 1887. It is stated that an estate holding a large amount of W. U. bonds has sold upwards of $1,000,000 of seven per cent. bonds to an European syndicate. Price is not stated. Recent application to list these bonds on Stock Exchange was part of condition of sale.

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A train of freight cars arrived at Vancouver, W. Territory, recently, with 40 miles of cable, consigned to Bartholomew & Baker from the Bishop Gutta Percha Company, New York. The cable is to go to the Hawaiian Islands. Bartholomew & Baker have the sole concession for 10 years, and a substantial cash subsidy from the Hawaiian Government, and will lay 400 miles of cable, connecting the five principal islands of the group, for the first section of which, forty miles, the cable has arrived, and will be laid forthwith. The telephone systems, of which these islands, with a population of 100,000, have the finest and most perfect in the world, will be connected with the capital by this cable when completed, and the following cities: Honolulu, Wailuku, Spreckelsville, Hilo and Haualei. Operations will begin at Honolulu, and the line will be laid overland to Koko Bay, and thence, by submarine cable, will be connected with a western point of the island of Malaki.

### The French Government Wish to Control the Telephone Service.

The French Government, says the *Chamber of Commerce Journal*, has decided to take the telephone service into its own hands, and not to grant concessions to private companies. The Société Général des Téléphones has had a little tussle over what it considered to be valid rights conceded by a convention in July, 1886, and which would prevent the exercise of State control proposed. This convention, it would appear, ceded to the company the monopoly of telephone working for 35 years with power to the State to acquire by purchase in 15 years. In November, 1886, a convention was also drawn up on these lines and submitted for Parliamentary sanction, in this respect only differing from the earlier dated convention. Parliament refused to recognize this convention, and a special commission recommended the State taking over the system. The company contended, however, that by its earlier convention, which did not require parliamentary sanction, they had the monopoly on the conditions above mentioned. On the other hand, on behalf of the Government, it was argued, in addition to certain questions as to whether the telephone system was or was not a public work of the nature to require parliamentary approval, that the earlier convention of 1886 was of no value because the decree by which it was approved had not been promulgated either in the *Journal Officiel* or in the *Bulletin des Lois*, and, in spite of the signatures attached to the decree, "it is a document which has not legal existence, and which has, moreover, never been communicated officially to those interested." As there appears little chance of the Government altering its view, it will be entitled to take possession of the telephones started by the company under its concession of September, 1884, the period of which expires in September this year.

### An Explanation of Lightning in a Clear Sky.

To the Editor of Electrical Review.

Your interesting Chicago correspondent wants a new theory to explain the lightning display which he witnessed lately, and which was evidently a brand new thing to him. There is but little that is known about such phenomena. It has long been known that what is popularly called "heat lightning" is simply a thunderstorm prevailing at such a distance that the sound thereof becomes dissipated before it reaches the observer's ears. I settled this point to my own, and to the satisfaction of others early in my telegraphic experience. It was in the summer of 1851, sitting around the door of the telegraph office, a number of gentlemen were discussing the prospects of a much needed rain. One called attention to the lightning in the north. Another said it was only "heat lightning," and indicated nothing. An old settler of wide experience was referred to, who said, "No, nothing but heat lightning." I was appealed to, and there being a lull in business I called up an office north of me and asked about the lightning. The answer came back quickly: "Storming about Memphis." The old settler was incredulous, but the newspapers confirmed it in a few days afterwards.

Now, the distance in a direct line between Gallatin, Miss., and Memphis, Tenn., is about 220 miles. Allowing eight inches per mile for the curvation of the earth, the storm must have been going in the clouds at an elevation of about six miles.

The height of clouds ranges, as we are told by Gay Lussac, who ascended four miles, and Glaisher, who ascended six miles, and both saw clouds much higher above them, from 1,300 feet to eight or 10 miles.

These storms are common in this country in summer, so common that they pass unnoticed But an observer is always repaid for the time spent in watching them. I stood out many nights

> "A sharer in the fierce and far delight,
> A portion of the tempest" (almost),

and have in memory some rare occurrences which I sometimes think ought to be in print. Very respectfully,

DAVID FLANERY.

Memphis, Tenn., July 27, 1889.

### PERSONAL.

President E. M. Barton, of the Western Electric Company, has returned from an extensive European tour.

Mr. Chas. H. Cone, the energetic Western representative of the Electrical Supply Company, was a welcome visitor among New York friends last week.

Mr. John I. Sabin started for his San Francisco home the first of the week. His friends all regret that he was compelled to return so soon, the death of Mr. Geo. S. Ladd making it necessary.

Mr. Chas. A. Brown, manager of the Western Electric Company, Chicago, is renewing old friendships in New York, and will take in the Niagara Falls Convention before returning to the little city by the lake.

Mr. C. R. Eberle, the superintendent of the Wilkes Barre (Pa.) Electric Light Company, was in New York last week inspecting electric lighting systems with a view to enlarging its plant. His company is now succeeding finely, and his city is the scene of much electrical work.

Mr. Wm. A. Hammett, formerly of Chicago, has moved to New York and will in future be found at 18 Cortlandt Street, in the Telephone building. Mr. Hammett has accepted the position of eastern manager for the Hoover, Owens & Rentschler Company, builders of the Hamilton-Corliss engine.

Mr. H. L. Shippey, secretary of John A. Roebling's Sons Company, and Mr. J. H. Seymour, president of the Clark Electric Company, have been named with others by the Board of Trade and Transportation as proper men to be appointed by the Mayor on the International Exposition Committees.

Mr. S. M. Bryan, of Washington, D. C., the versatile head of the telephone interests of the District of Columbia and Maryland, was a New York visitor last week. There is talk of holding next year's telephone convention in Washington, and this will be one of the things that will take Mr. Bryan to the Minneapolis convention next month.

Mr. W. A. Hammer, of Newark, N. J., who has charge of the Edison talking phonograph at the Paris Exposition, writes home that it is the wonder of the day, and the astounded auditors cannot understand how it speaks in different languages. One of Buffalo Bill's Indian chiefs, who shouted a war hoop at it, upon hearing the return of the yell, would have nothing more to do with it.

Mr. W. A. Vail, the well-known and successful telephone manager, has resigned the general superintendency of the Metropolitan Telephone Company of this city, to accept the position of general superintendent of the Boston Super-Heated Water Company. Mr. Vail was one of the most popular men in the telephone business, and a large circle of friends will most sincerely extend their best wishes for his complete success in the important work he has assumed in Boston.

Gen. E. S. Greeley, the well-known electrical manufacturer, has just returned from Paris where he spent several weeks going through the Exposition. The General was very actively associated with Senator Hawley in the Philadelphia Exposition of 1876, and is an authority in this line and states that the Paris Exposition is the greatest and most interesting exposition the world has yet seen, and that the people of the United States have a great work ahead to be able to excel it in 1892.

Mr. W. D. Sargent, Mr. Ed. J. Hall, and Mr. Ed. J. Hall, Jr., returned from Europe on the "City of Paris" last week, all looking as if the trip had been a thoroughly enjoyable one. A large party of friends were down at the pier to welcome these well-known telephonists. Mr. Sargent will probably return to Paris in a few weeks, to remain until the Exposition closes in November. It is with difficulty that Monsieur Sargent speaks his native tongue, having become so accustomed to the graceful language of the Gauls.

## Telephonic News

⁂ A telephone exchange is being put in at Fort Payne, Ala., by W. T. Gentry, of the Southern Bell Telephone Company.

⁂ During the past ten days the telephone service of Beverly, Mass., has been completely demoralized. The company has been engaged in transferring the wires to the large poles recently erected.

⁂ The Union County Board of Freeholders, Lorneville, N. J., has determined that all the telegraph and telephone poles along the line of the county road improvements must come down, and have notified the companies to this effect.

⁂ The New England Telephone Company, East Boston, Mass., will lay a cable across the stream near the North Ferry. They have petitioned the board of ferry directors for leave to make the connection with the wires at the East Boston headhouse. The directors have given their consent on condition that a reasonable sum be paid for the privilege.

⁂ The New England Bell Telephone Company, Boston, Mass., is making good progress in laying its triple conduits through the streets where the service requires it to rid the streets of poles and the roofs of tons of wire strain, as authorized by the city government in the spring. The refilling of the streets over the tar-coated ducts is being very thoroughly done with ballast of rock and Portland cement beneath the surface pavement.

⁂ The managers of the Long Distance Telephone Company have been in Wilkes Barre, Pa., recently and they propose to convert Wilkes Barre, Mauch Chunk, Hazleton and Scranton in a circuit with New York and Philadelphia. This will enable a talk with anybody having phones in the above named cities. The company which operate this system give good service and the speedy operation of the new line will no doubt be warmly welcomed by the public generally.

⁂ The Cumberland Telephone and Telegraph Company filed a bill in the Chancery Court, Nashville, Tennessee, against the Capital Electric Light Company, asking that the defendants be enjoined from proceeding with the work of erecting pole and wires thereon, because, it is alleged, the wires, as the company intends to put them up, will interfere with the telephone wires, and cause damage and annoyance. The Capital Electric Light Company is the one with which the city has contracted for 150 arc electric lights. The contract was to have gone into effect June 1, but there has been some delay. Without interruption, the company would probably have been ready to begin furnishing lights before the middle of next month.

⁂ The Missouri & Kansas Telephone Company finished, July 27th, a metallic circuit from Kansas City to Warrensburg, Mo., a distance of about 80 miles. The wire is No. 12 standard gauge, hard drawn copper, weighing 172 pounds to the mile; this connects the Holden and Warrensburg exchanges with Kansas City, and it is quite likely the company will extend the line to Sedalia, Mo., this year. They also finished last week, an extension of the line from Troy to Severance, Kan., connecting the latter town with the St. Joseph exchange. This company is now building a line of No. 12 hard drawn copper, 40 poles to the mile, which will connect Wichita with Valley Centre, Sedgwick, Newton, Burrton, Halstead and Hutchinson, Kan., about 75 miles. They are putting in an exchange at Hutchinson, Kan., to take the place of the Cushman exchange, which was recently closed up by the United States Court, and will also build an exchange at Newton, Kan., within 60 days.

### A Good Thing for Telephone Companies.

We illustrate in this issue the very simple apparatus and method whereby the present large outlay for underground cables promises to be reduced nearly 50 per cent. Telephone managers all over the country, particularly in the large cities, are to-day considering seriously the question of placing their wires underground and preparing for a change from the grounded to the metallic circuit, which, leaving out the question of cost, is what every telephone man would like to furnish to his subscribers. The rapid extension of the long distance wires and the superior quality of the service thereon draws the line on grounded circuits—and, like the Chinese, they must go, though it may be slowly. The exodus has already begun in New York, Brooklyn, Buffalo and other large cities connected by the long distance wires. Anticipating this change the conductors of cables are now generally made up in twisted pairs instead of "bunching" the single conductors as has been usual heretofore, the "bunched" cable being useless for metallic circuits on account of the difficulty in securing parallel and contiguous pairs. When conductors are twisted in pairs, however, and it is desired to use the cable for single circuits, the cross-talk between the two wires of a pair is so great that but one conductor of the pair can be used satisfactorily for distances over 500 feet and the practice is to ground the twin wire at the office and outside terminal. This reduces the capacity of the 100-conductor cable to 50 subscribers, as would be the case if the company was prepared, financially and otherwise, to connect up and handle the subscribers on metallic circuits. Before subscribers can be so handled, much time and money must be spent for underground conduits, cables and central office equipment of suitable character. During the transition from single to metallic circuits no wide awake manager will care to increase his stock of "bunched" cable, and the object of this invention is to enable him to purchase the most improved type of cable and use each conductor for a subscriber as in the old style cables, or, if desired, *a combination of single and metallic circuits* until all wires are required for metallic circuits.

This is accomplished by the use of a connecting plate *B* (see Fig. 1), to which the conductors *F* and *G* (see Fig. 2) of the cable sections *C* and *D* are connected in regular order in a copper junction box *E* and a transposition plate *A* (see Fig. 3), whereon the wires of the pairs which are required for single circuits are systematically transposed so that no two wires are parallel or contiguous for more than the distance between junction boxes which should be placed about 500 feet apart, whether on aerial or underground cable. The work of connecting the conductors to the plate is done quickly and easily. The transposition plates are interchangeable and can be made up readily at the office or factory as ordered, and are simply attached to the connecting plate by screws. The copper lid is then soldered on the box and the joint is complete. When it is desired to increase the number of metallic circuits, or use all wires in that way, in any cable connected as described, a plate with the proper transpositions, or with the wires connected in pairs as required, is substituted for the original plate. The lid of the box can be removed and replaced at any time in a few minutes by the use of the soldering iron. The copper box occupying not over twice the space of the ordinary lead sleeve is a decided improvement thereon.

When it is considered that this method enables a company to order the best type of cable made, use it to its full capacity and in combination, keep up with the progressive demand for metallic circuits, avoid filling their conduits with cables which may be ruined or laid aside in a few years, and save interest and depreciation on plant not in actual service, and also duct or right of way charges on same, it is probable that its value will be promptly recognized. The New York and New Jersey Telephone Company are using the plates extensively, and with results gratifying to the company and to General Superintendent J. C. Reilly, who received letters patent for this invention in April last. Being a practical telephone man of long experience, Mr. Reilly is familiar with the needs of the hour, and has worked out an invention at once original and of practical value.

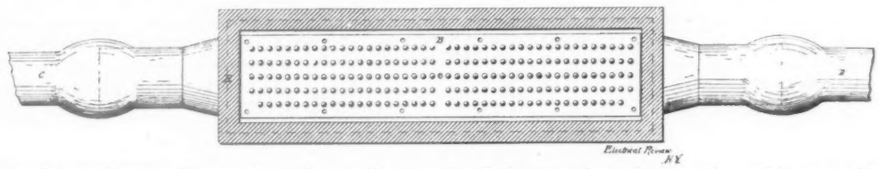


FIG. 1.—REILLY SYSTEM.—PLAN OF SHEET COPPER JUNCTION BOX E, SHOWING CABLE SECTIONS C AND D ENTERING BOX, AND CONNECTING PLATE B IN POSITION.

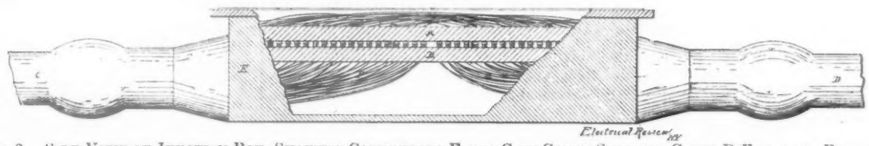


FIG. 2.—SIDE VIEW OF JUNCTION BOX, SHOWING CONDUCTORS F AND G OF CABLE SECTIONS C AND D ENTERING PLATE B, AND TRANSPOSED THROUGH SPRINGS I AND WIRE H ON TRANSPOSITION PLATE A.

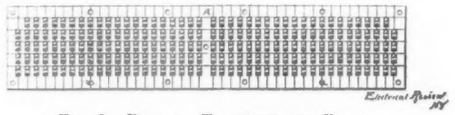


FIG. 3.—PLAN OF TRANSPOSITION PLATE.

⁂ All the towns in the Inland Empire, says a Portland (Ore.) exchange, are keeping up with the procession, and some of them are making great strides of progress. Colfax has just ordered a plant for 35 additional arc lights, and Moscow has ordered a 500 incandescent plant. The system of long distance telephones in use in that section throw completely in the shade the telephone system in this vicinity. Telephone lines branching from Colfax reach Spokane Falls and Walla Walla via Lewiston, a distance of about 100 miles. Portland, to equal this, should have telephone lines to Vancouver, Hillsboro, Forest Grove, Salem and all the other towns in the Willamette valley and even to Tacoma and Seattle. A five minutes conversation over one of these lines at a cost of 50 cents would be a great thing for the public at both ends of the line.

### The Telephone Girl Again.

The young men of the daily press of the country delight to write about that mysterious and nearly always sweet-voiced being, the telephone girl. A bachelor reporter in the Albany *Journal* presents the latest contribution of this kind:

The telephone girl is an interesting creature, and she knows a great deal more than you imagine. She is pretty—of course she is—she dresses with nice taste, and if the dyspeptic old fossil who is wont at times to scold her over the telephone for some trivial thing, such as switching him on to an undertaker when he wanted to speak to some one at the bank, could only catch a glimpse of the smiling face at the other end of the wire, he would feel that he deserved a thrashing for his conduct.

And he would, too.

The telephone girl is a girl of the period. She can rattle off an abundance of slang upon the slightest provocation, and if occasion requires it can give expression to some curious comments on matters political. The fact that she constantly hears old Dash, who has held office since the days of Andrew Jackson, talking with some other veteran, is the reason for this. She can tell you if she wants to on what night last week young De Smith's baby was taken sick with the colic, and how the worthy *pater* could not be found, but was finally discovered with a congenial party indulging in the fascinating game of draw-poker. But she won't tell you this if she is a sensible girl—which she is. She could also tell you the circumstances which led to hot words over the wire ending in the well-known merchant calling the gray-haired banker "an old skinflint." She has heard the storekeeper asking his customer for a little money on that account, and she has caught the reply of the former to the effect that he would call in the morning. She catches the faint chuckle, too, and knows that the storekeeper will have to wait a little longer.

She won't tell you anything of the kind, but is not afraid to confidentially give you some points concerning Brown, the young broker, who is considered a lady killer of the first water. Brown has bored several of the girls to death with his attentions. The other evening he rang, and when answered, asked in a confectionery voice if the dear one would go and take some cream with him. But the night operator was at the instrument, and he was quite amused. Raising his voice until it reached a *fortissimo* he cried "Rats," and the shock was so great that he could hear the instrument drop from Brown's hand and knock against the wall.

Poor abused Brown.

The exchange room of the Hudson River Telephone Company on Broadway is where 15 girls chew gum and chatter all day long. What noise they make! They are seated at a long table, and occupy high revolving chairs. The switchboard is directly in front of them, and they make connections by pulling plugs out and putting them in different places. The telephone receiver hangs from the ceiling, and need not be taken in the hands, as it is supported, and the transmitters are of the Edison-Blake pattern.

There are now about 1,500 subscribers, and each girl takes care of 100. This seems like a great many, but after a little practice they become very expert, and can handle their work easily and well.

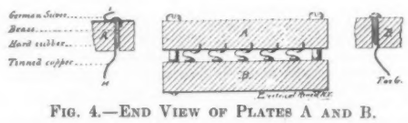


FIG. 4.—END VIEW OF PLATES A AND B.

Naturally, one would think that the telephone girl would grow sour-tempered as the days roll by, but she doesn't; and it's a wonder, too. There is that plaguey old busy-body on number blank, who gets angry if she isn't accommodated in less than 10 seconds, and then there is that smart young man who is always dispensing complaints, tenderly asking about the fair one's health, and extending an invitation to indulge in some soda. If the latter only knew how much amusement he creates for them all, he would forever hold his peace.

"Is that you, Central?" is the burden of the song she hears all day. "Yes," she replies. "Then give me number blank," comes next, and then there is a pause. Perhaps no one answers at the end of the line, and the party of the first part indignantly blurts out: "I say, Central, are you going to give me number blank?" "Why, yes; I've done so," she answers. "No, you haven't. I'm in a hurry and can't wait all day," is sent back, and then the telephone girl smiles sweetly and tries to find out the trouble. And all this time the man who is in a hurry swears softly to himself, forgetting that he is near the transmitter.

But nevertheless the telephone girl's lot is not such an unhappy one, and there are lots of sunbeams in her path.

### The Missouri and Kansas Telephone Company.

President J. R. Mulvane, of the above company, has issued the following statement to the stockholders:

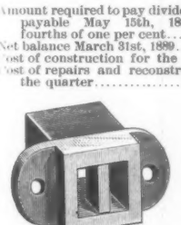
"It is our pleasure to hand you herewith statement of earnings of your company for the six months, ending June 30th, 1889.

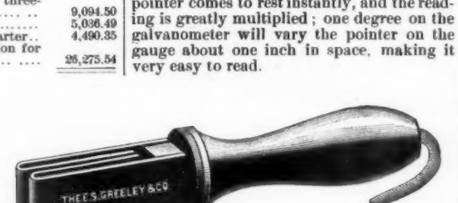
"Your directors have deemed it prudent to strengthen your company and adopt such a rate of dividend as can be maintained. The fine earnings for the second quarter we can hardly expect to duplicate; our plant must be put in good order for the coming winter's storms. We have had our share of the depression from short crops, and we now look forward to an immediate revival of business, as our region has been blessed with wonderful crops. This will make added demands on us for more plant, all of which makes more valuable your property."

Treasurer N. R. Ferguson's statement is as follows for the two quarters:

For the three months ending March 31st, 1889:

| | | |
|---|---|---|
| Gross earnings | | $101,764.75 |
| Gross expenses | | 94,717.82 |
| Net earnings | $7,046.93 | |
| Surplus December 31st, 1888 | 7,084.06 | |
| | | 14,130.99 |
| Amount required to pay dividend No. 17, payable May 15th, 1889, three-fourths of one per cent | | 9,094.50 |
| Net balance March 31st, 1889 | | 5,036.49 |
| Cost of construction for the quarter | | 4,490.35 |
| Cost of repairs and reconstruction for the quarter | | 26,275.54 |






VICTOR PLUG AND SWITCH.

| | |
|---|---|
| Number of subscribers added | 337 |
| Number of subscribers discontinued | 318 |
| Net gain during quarter | 19 |
| Total number exchange subscribers | 6,407 |

For the three months, April, May and June, ending June 30th, 1889:

| | | |
|---|---|---|
| Gross earnings | | $104,641.34 |
| Gross expenses | | 80,570.64 |
| Net earnings | $24,070.70 | |
| Net earnings, second quarter | 7,046.93 | |
| | | 31,117.63 |
| Dividend No. 17, paid May 15th, 1889, three-fourths of one per cent | | 9,094.50 |
| Balance June 30th | | 22,023.13 |
| Amount required to pay dividend No. 18, one per cent. payable on or before August 15th | | 12,126.00 |
| Balance to surplus | | 9,897.13 |
| Cost of construction for the quarter | | 8,714.26 |
| Cost repairs and reconstruction for quarter | | 11,359.38 |
| Number of subscribers added | 341 | |
| Number of subscribers discontinued | 354 | |
| Net loss | 13 | |
| Total No. exchange subscribers | 6,394 | |

### A New Electric Light Gauge.

The Standard Electric Time Company, of New Haven, Conn., are now introducing their new electric light gauge, which they have had a great deal of inquiry for since it was exhibited at the electric light conventions in Boston and Pittsburgh. It has now been completed and thoroughly tested, and will no doubt meet with a large sale. There are many advantages in using this gauge in central electric light stations. It has a large and clear dial about six inches in diameter, and can be seen at a greater distance than any other instrument. It is "dead beat," and known as a zero gauge.

When the long pointer stands perpendicular, or at 0, the current is normal for any current to which the gauge may be set, from one to 50 amperes. The figures "Above" and "Below" denote the number of amperes above or below the normal. The gauge shown in the cut is set for a normal current of 10 amperes, and one above would be 11 amperes, or one below would represent nine amperes. The pointer shown in the opening in dial indicates the direction the current is flowing, and will point toward the negative binding post while it will make no difference with the long pointer.

The gauge is also furnished with an alarm attachment which will ring the bell shown at any desired variation of the current above or below the normal point. This is of great advantage to any one operating an electric light plant, as attention is immediately called when anything is wrong.

The simplicity of this gauge makes it reliable and valuable.

A smaller size of the gauge is made for fire alarm circuits, and the zero or normal

A NEW ELECTRIC LIGHT GAUGE.

point is set to compare with the standard 30 used by the Gamewell Fire Alarm Telegraph Company. When the current drops to a certain point, or the line is broken, the alarm bell will ring until stopped or attended to. There is quite an advantage in this gauge over the ordinary galvanometer, as it is not affected by any outside influence. The pointer comes to rest instantly, and the reading is greatly multiplied; one degree on the galvanometer will vary the pointer on the gauge about one inch in space, making it very easy to read.

### The Victor Arc Plug and Socket.

The above cut represents a form of plug and socket that is a very desirable affair for switching arc light, power and other heavy currents. It is known as the Victor Arc Plug and Socket, and is manufactured by The E. S. Greeley & Co.

While the device is new and novel, it is not so in the sense of being experimental or untried, as a number of them have been in use during the past year under the severest conditions in arc light service, and have given unqualified satisfaction, which has led to their exclusive employment in stations where they have been on trial.

The socket, as will be seen, consists of a double chamber of solid cast brass, into which the plug can be quickly thrust or withdrawn. The plug consisting of heavy spring metal of appropriate shape secures broad surface contacts on its four distinct faces as well as the edges, which not only guarantees the connection, but holds the plug firmly in position.

As no time is lost in fitting the plug to socket in making changes, but quickly snapped into place, the most rapid character of work in switching is the result.

The sockets are also made in a duplex form when required, so that the second connection may be established before the first is disturbed.

The sockets may be neatly mortised into cabinet work and fitted almost flush with the wood surface, and thus make a very attractive as well as convenient switchboard.

### A Noble Metal.

TO THE EDITOR OF ELECTRICAL REVIEW:

Charles Wood, an assayer, in 1741 found in Jamaica some platina which had been brought from Carthagena and which he forwarded to London for inspection as a curiosity.

The first to mention platina by its present name, however, which means "little silver," was Don Antonio Ullon, a Spanish mathematician, who, in 1735, accompanied the French academicians who were sent to Peru by their sovereign to measure a degree of the meridian in order to determine the figure of the earth.

After his return he published at Madrid in 1748 a history of his voyage, and mentioned the abandonment of the gold mines in the territory of Choco on account of the presence of platina, which being too hard to easily break or calcinate, the gold could not be extracted without much expense and great difficulty.

It is reported in the Chemical Annuals for July, 1792, that the miners of Choco, discovering platina was a metal, began to use it in adulterating gold, in consequence of which the Court of Spain, fearing disastrous results therefrom, attempted not only to prevent its export but to conceal the discovery of the metal from the world.

To effect this all gold brought from Choco to be coined at the two mints of Santa Fe was carefully inspected, and all platina separated and given to the king's specially appointed officers, and when a sufficient quantity had accumulated it was taken to the river Bogota, about two leagues from Santa Fe, or to the river Cauca, about one league from Papayan, and in the presence of witnesses thrown into the rivers.

From the great specific gravity of this metal, it being the heaviest known, together with its malleability and ductility, and the fact of its great resistance to the action of acids, alkalies and sulphurs, it has become known as the "metal of the chemists."

Some of the most important discoveries of modern chemistry would have been impossible without the aid of platina. It is so soft it may be readily cut with the scissors, and when formed into a mirror, reflects but one image.

Platina has been found in various parts of the world, Peru, New Granada, Brazil, St. Domingo, and in the gold washings of California, Australia and Borneo; but the principle source of supply is in the Ural Mountains of Russia and the auriferous sand of Kuschwa, in the Auralian Mountains of Siberia.

Platina is rarely found in pieces larger than a few grains in weight.

The chief uses of platina are for the various apparatus used in chemical laboratories, such as crucibles (first crucible was produced in 1784), spoons, blow-pipe points, tongs, forceps, and boilers or stills for concentrating sulphuric acid. A still of this kind, valued at 95,000 francs, was exhibited at Vienna in 1873, capacity 20,000 pounds of sulphuric acid daily.

An ingot valued at $20,000 was exhibited at the London Exhibition of 1862.

On account of the high degree of heat requisite to fuse or melt platina—melting point 1,460° to 1,480°—it is the only metal used for making the pins of porcelain teeth, and on account of its value and lack of any known substitute, has become the greatest item of expense in their manufacture.

It is also utilized for making fine jewelry, and a great and growing demand has been but recently created by the development of electricity.

The Russian Government began coining platina for general circulation in 1826 and continued until 1845, when by an imperial ukase the coinage was discontinued and the $2,500,000 issued called in because of the great fluctuation in the price of the metal.

The average production of platina metal from 1828 to 1845 amounted to 2,623.8 kilos or 5,784.48 lbs. per annum; from 1875 to 1884 inclusive, the average yield of the Russian mines was *3,483.3 lbs. per annum, showing a decrease since 1882, the maximum year, of 45 per cent. in the yield. The Russian mines yield 80 per cent. of the total product of the world.

The price of platina, which has always ruled very high in consequence of the continually increasing demand, the limited source of supply, without any new discoveries of moment sufficient to relieve the market, is constantly advancing, so rapidly indeed as to cause serious apprehensions for the future.

Those industries whose manufactures depend largely on platina as their chief element of cost (and with no known substitute in sight), such as stills, crucibles, porcelain teeth, electrical and chemical apparatus, etc., are suffering more or less seriously from this increase in price, and for self protection it would seem will be obliged to advance prices proportionately.

Philadelphia, August 1st.

*Above figures are from the latest statistics obtainable, up to May, 1888. Russian officials are said to be very dilatory with their reports.

## TELEGRAPHIC

.... The Soldiers' Home Electric Railway Company, Montgomery County, Ohio, has been incorporated, with a capital stock of $50,000.

.... The action of the Postmaster-General in asking the Western Union to handle the Government messages for a mill a word, is not meeting with popular approval. The press generally condemns the action.

.... Minneapolis, Minn., is considering two electric railway schemes. One of the ordinances presented was a franchise to William Dawson, William Lindeke, Amherst H. Wilder, Theodore L. Schurmeier and Edward G. Rogers, and it has a tenure of 50 years and agrees to carry passengers for a single fare of five cents. The other is to grant a franchise to William Pitt Murray, C. D. O'Brien, Albert Scheffer, Eugene A. Hendrickson, Charles H. Lineau, I. V. D. Heard, Chas. L. Haas and E. L. Maben, and the right is given the company to designate the streets over which they may be permitted to operate their lines, the same to be in writing, and the franchise is to run but two years. One half of the line is to be completed and in operation within one year and the balance within two years. It is to reach the business center, connecting all suburban districts.

### Electrical Work in St. Louis.

The investments now made and shortly to be made, and the values of the electric plants in St. Louis, are given in the *Post Dispatch* as follows:

| | |
|---|---|
| Bell Telephone Co | $400,000 |
| Municipal Electric Light & Power Co | 400,000 |
| Missouri Electrical Co., capital stock | 600,000 |
| United Electric Light & Power Co | 500,000 |
| St. Louis Illuminating Co | 175,000 |
| Brown Plant, to be erected | 60,000 |
| Fire and Police Telegraph and Telephone | 250,000 |
| Western Union Telegraph Co | 100,000 |
| Isolated Electric Light Plants | 400,000 |
| St. Louis Power Co | 30,000 |
| District Messenger Service, estimated | 10,000 |
| Total | $2,915,000 |

There are nearly one hundred buildings lighted by electricity from isolated plants furnishing from 40 to 1,600 16-power incandescent lamps, and from 10 to 50 2,000-power arc lights. These plants average nearly $5,000 each.

Of the isolated plants used for private illumination that of the St. Louis Exposition, in Music Hall, is the largest, costing about $10,000. This plant is being added to in preparation for the Electrical Exposition which will open next September. At this exposition every character of electrical contrivance will be presented.

The contract for lighting the city of St. Louis, recently let, is one of the largest municipal contracts for electric lighting ever closed in this country. With a view of securing the best service and figures the old dividing line of Washington avenue was preserved.

On the 1st of next January the city's contracts with the gas companies expire, and after that date the streets of the city north of Keokuk, more than 300 miles in length, and the alleys will be lighted by electricity. As far as lighting the public buildings the city stands on the same platform as private consumers, being bound by no contract with the gas companies. The wires have already been placed in the public buildings, which will be lighted with electricity as soon as the plants begin operations.

The superintendent of the Municipal Electric Light and Power Company, speaking of the extensive use to which electricity is being applied in St. Louis, said: "When completed, the plant of the Municipal Company will represent $1,000,000, and I think it a very safe statement to make that before the expiration of the coming 12 months the electric plants of St. Louis will represent an investment of more than $5,000,000."

Two street car companies, the St. Louis Railway Company and the Lindell Railway Company, are now engaged in changing their motive power and constructing overhead electric systems, requiring immediate investments of over $200,000. Extension of the systems on these lines and the adoption by other companies now having contracts under consideration will, within the next 18 months, increase the investment in electrical plants for street car locomotion to nearly $750,000.

* * The Metropolitan Electric Railway at Portland, Ore., is being pushed rapidly to completion.

* * The petition of the street car company of Augusta, Ga., for privileges to employ electricity as a motor was favorably acted upon by the railroad committee of the council.

* * The electric light plant of the Pennsylvania Steel Company, Harrisburg, Pa., has received an additional Jenney dynamo, and is now being placed in position. The entire works will be then furnished with electric light.

* * The Oakland Electric Light and Motor Company, of Oakland, Cal., has erected an iron tower 100 feet high, at the junction of San Pablo avenue and Broadway, having five arc lamps, to demonstrate the efficiency of its system for street lighting to the city.

* * An effort is being made to effect a compromise between the two electric railroad companies at Reading, Pa.—the East Reading and the Neversink Mountain—now at war, both of which desire to occupy South Ninth street, this city. It is believed that the tracks can be laid side by side, or that both companies can run their cars over one track from Penn street to Muhlenberg, where the routes diverge. The committee on railroads will hear all parties interested this week.

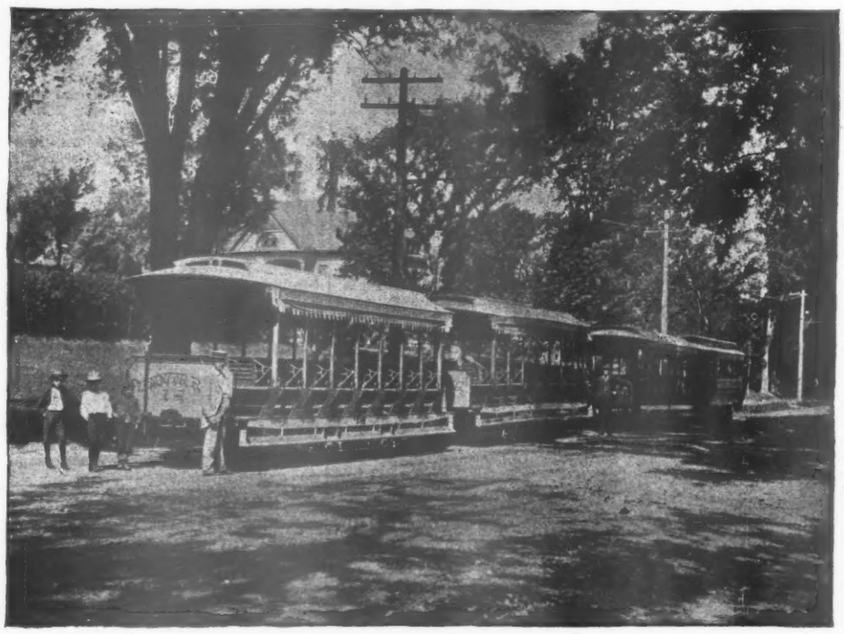
* * Mr. W. B. Knight, chief engineer of the Northeast Electrical Railway Company, of Kansas City, Mo., who has the contract to build the road for $250,000, closed a contract with the Thomson-Houston Electric Company for all the electrical appliances for the road. The electrical equipment will consist of three 80 horse-power electrical dynamos, the furnishing of 10 cars with two 15 horse-power electrical motors each, the electric lighting of cars and power house, and all other electrical work necessary. The contract is for about $50,000.

* * Work on the power plant at Troy, N. Y., for the electric railway is progressing rapidly, and in a very few weeks the people who travel over the Troy and Lansingburgh line will have an opportunity to determine whether or not an electric road is a success. The two big boilers at the Lansingburgh barn are in position. Their combined horse power is 248. The engine is being placed in position. This week the company will lay an experimental stretch of the new Johnstown patent street car rail, in front of the Lansingburgh park. The cars will be running from the Waterford bridge to the city line by September 1st.

* * The Denver Tramway Co., Denver, Col., has contracted for the rails, electrical materials, ties, spikes, and all other material for the South Broadway electric motor. As fast as the material arrives it will be distributed along the proposed line of the road on Broadway, from Alameda avenue to Sheridan avenue, and as soon as a sufficient amount is on the ground the work of construction will commence. The cars have also been ordered and will be built in Denver. All the material that it is possible to get here is to be furnished by Colorado factories. It was intended to take the power for the new line from the company's power-house on Broadway and Colfax avenue by wire out to the new line, but the company has finally decided to put up a power-house at some point on the line of the new road, the lots for which have been secured. In all probability this new line will be in running order inside of 90 days.

## The Plymouth and Kingston Street Railway.

The electric railway, built by the Thomson-Houston Electric Company for the Plymouth and Kingston Street Railway Company, has been in operation since June 8th without interruption. The track is four and one-half miles in length, is built of steel T-rail, and extends from Jabez Corner about a mile and a half below the center of Plymouth, and through Sandwich, Market, Leyden, Main and Court streets in Plymouth, and through what is known as Spirit Pasture into Lower Kingston. The road is composed of a number of sharp curves and grades, the most difficult being Spring Hill on Market street. The track makes a sharp curve from Sandwich street, and strikes at once a grade of 10 per cent. which the cars have to ascend, and upon reaching the top of the hill, makes a double curve in Main through Leyden street. It will be seen from the above that a severe strain is put upon the motors, and that a motor car with a tow car attached, loaded with 125 passengers, will climb this hill with apparent ease, speaks the highest praise of the Thomson-Houston apparatus. The motor cars, three in number, are each equipped with two 15 horse power Thomson-Houston motors, and receive power for operating from the Plymouth Electric Light Company, which operates an 80 horse power Thomson Houston generator. The



THE PLYMOUTH AND KINGSTON ELECTRIC ROAD.

single trolley overhead construction has been used throughout the length of the line. Almost the entire route overlooks the beautiful Plymouth harbor, which makes it a very pleasant ride, and the fact that the railway company has to run two trains each way, consisting of a motor car and one tow car attached, and that over 2,000 passengers are carried a day, proves the popularity that the railway has gained with the citizens of the two towns.

* * The success of the East Side Electric Railway, in Cleveland, Ohio, has been so great, and its popularity with the citizens of Cleveland has been so marked, as detailed in our paper recently, that it is not surprising that we have to record this week that another street railway company in Cleveland has decided to adopt electric power upon its lines. This company is the Broadway and Newburgh Street Railway Company, of which Mr. Joseph Stanley is president, and is now operated by horses. The contract which this company has signed calls for 16 complete electric car equipments of the latest Sprague type, and using the Sprague improved electric railway motor, necessary dynamos, station equipment and other necessary apparatus.

## Shall Electricity Supplant Hanging.

### CONCLUSION OF TESMIMONY IN THE KEMMLER CASE.

The REVIEW has published the main features of the interesting testimony in this case, in which the attorney, Hon. Bourke Cockran, is endeavoring to prove that the law condemning his client to be killed by electricity is a "cruel and unusual" means of ending life. The further taking of testimony, after leaving New York, was resumed in Buffalo, and continued a few days last week. It was concluded last Thursday, and the referee will revise the testimony and submit it to County Judge Day, of Cayuga County, and the case will be argued on September 4, unless the Judge orders otherwise.

The substance of the Buffalo testimony we give below:

A tabulated statement as to the resistance of electric currents, made out by Prof. Gray, was offered in evidence, but was objected to by Mr. Cockran on the ground that it did not show the size of the dynamo used nor the length of contact. It was admitted.

Dr. J. A. Hoffmeyer was the first witness. He testified to making a post-mortem in the case of Lemuel W. Smith, who was killed in 1881 by an electric shock at the Brush Electric Light Works in this city.

Testimony in regard to the death of Smith was also given by Philip Fogarty and Policeman Harrington.

Dr. Joseph Fowler was next sworn. He was coroner in 1881, when Smith was killed at the Granson street works. He was present at the autopsy, and later made one for his own benefit. The different organs were about normal, but the blood was thinner.

By Mr. Quimby—Did you make any effort to trace the current? A.—I did.

Q.—How could you do it? A.—I noticed that there was a discoloration extending across the chest from one shoulder to the other.

Q.—It looked black and blue? A.—It did.

By Mr. Cockran—Now, doctor, there was no apparent cause of death, was there? A.—No apparent cause; no, sir.

Charles C. Weber, who until a short time ago was superintendent for the Brush Electric Light Company at Buffalo, said he remembered the night that Moulton was killed on Michigan street, and visited the spot soon after the accident. Besides the regular light wires running through the street there was also an incandescent wire. The witness examined the wires near where the accident occurred, and found one crossed over three or four others. He also told of the strength of the machines.

"What was the voltage of the machines running that night?" asked Mr. Quimby.

"They were for 650 lights, alternating dynamos, with a voltage of 1,000," answered Mr. Weber.

Mr. Cockran wanted to know what kind of a current one wire hanging over three or four more would produce.

Mr. Weber thought it would be alternating.

Mr. Weber's statement as to the voltage of the current the night Moulton was killed, namely, 1,000, was considered important by the referee, as that is exactly the strength of the machine fixed up for Kemmler.

Dr. George E. Fell was sworn by the State. His testimony was very amusing, and at times he became very warm under the pointed cross-examination of Mr. Cockran.

"In 1887 did you have occasion to use a current of electricity for the extermination of dogs in this city?" asked Mr. Quimby.

"I did," was the reply.

The doctor explained at length one of the experiments on a dog about 50 pounds weight. The dog was put under the influence of chloroform, his heart exposed to view, and artificial respiration kept up. The dog was placed in the box, which forms part of the apparatus, still unconscious, and an iron bit being put in his mouth, he received a shock of electricity. The heart stopped beating instantly, and the dog became a mere mass of flesh.

"From what you know about electricity, what do you say as to whether or not death can be produced painlessly by an artificially generated current?" asked Mr. Cockran.

"My belief is that death can be produced by electricity painlessly and certainly, so that respiration cannot be renewed."

"Can you tell what voltage would be sufficient to cause death in every instance?"

"I don't know exactly how I can answer that question," replied the doctor, "without experiments having been made on human beings."

Charles F. Durston, warden of Auburn prison, was called by Mr. Cockran, District Attorney Quinby having rested his case. He said that the paraphernalia was prepared by H. P. Brown. It was ordered under contract with the Superintendent of Prisons. The contract was accepted in evidence by Mr. Cockran.

Mr. Durston also said that the contract called for an alternating current, a dynamo, electrodes, and everything required except the lamp board. This is an attachment for the wall, with about 28 lamps to indicate the force furnished by the exciter. The apparatus will be used for Kemmler if it works well.

"Will you use it?" asked Mr. Cockran.

"After it has been tested."

"On Kemmler?"

"No; after a proper test, a scientific test. If it does not prove up to what the agreement calls for we shall not use it." "What test do you propose?" asked Mr. Cockran.

Mr. Durston admitted that the only test would be that on Kemmler. He said the lamp board would be an additional precaution. The wires are placed in position, but the apparatus has not been started. He had not examined the electrodes. They had only just arrived. He did not know how they looked. He understood that the *contract required Mr. Brown to conduct the execution*, but he had an idea that the time of the original contract had expired. He supposed that the law would rely upon himself to touch the button. He admitted that he was scientifically ignorant of the effects of electricity.

Mr. Cockran suggested that he knew about as much on the subject as ordinary men, and a little more than the experts.

Mr. Durston said the appliances furnished by Mr. Brown would be used unless he was satisfied that some other appliance was deemed better. He did not regard Mr. Brown as a volunteer. He had been employed and would be paid as an expert. Mr. Brown would get no pay until the apparatus was put up and ready for operation. He thought the amount to be paid Mr. Brown was $1,600. The diagram already presented in evidence was shown to him showing the apparatus it was proposed to use. He said it was correct, except that the chair was not presented as reclining sufficiently.

Mr. Brown was subjected to a cross-examination at the hands of Mr. Cockran as to the tests he had made.

It was agreed between Mr. Hatch and District Attorney Quimby that the evidence of the boy who was shocked at the time the negro Moulton was killed should be taken here later on. It was also arranged to have taken the testimony in New York of a man now in the hospital who had his hand burned by a contact with an electric wire and then the taking of testimony was declared ended.

### A Boston View of the Electrical Industry.

The active minds of the editors of our great dailies are beginning to realize the wonderful growth and extent of electrical work. The magazines, the great weeklies and other general publications are taking notice of the results that this comparatively new science and its energetic apostles have wrought in the past 10 years. A very good article calling attention to this industry appears in the Boston *Post* of recent date, which, among other things, contains the following:

A dozen years ago the electric current, beyond the telegraph, electroplating and a few minor uses, was but little better than a plaything. To-day there is scarcely an industry in which it does not play an active and in many cases a vital part. Its glittering light transforms night into day; its tremendous volume welds our iron and steel; its fierce heat reduces the diamond to combustion; its limitless power carries our loads; its subtle force annihilates time and space, and its presence may be detected in thousands of manufactures, while its mysterious workings enables us to listen to the familiar voices of our friends hundreds of miles away. And yet, with all the results that have been achieved, some of them so marvellous as to be almost beyond belief, it is the same unknown, indescribable element that it has been for centuries, baffling the skill of the wisest and most experienced and causing all the more wonder from its very mystery. The starting point of this recent rapid growth in electrical discovery may be dated from the invention of the telephone. Then came the practical dynamo, then the alternating current, which allowed the fluid to be adapted for different purposes, increasing its volume or its voltage as was desired, by means of converters, and thereby giving it a practicability never before attained. This opened an almost unlimited field, which even now is by no means filled. The electric motor followed, discovered, it is said, by a careless workman who made wrong connections between two dynamos, and was astonished to see one operate without any apparent cause, and this discovery led to the transmission of electric power by wires from a central station, an industry that alone is to day occupying millions of capital. The great impetus given to electric development brought about other branches of electrical research, so that many startling improvements have been made in all kinds of electric appliances. Signals of every conceivable description, insuring speed and safety; devices for economizing labor as well as time; articles for convenience and comfort, in fact, almost everything has been quickened and improved by the flash of the electric current. The public has finally become accustomed to marvellous tales, and when the statement is made, as was recently done, that Boston and New York could be brought within two hours of each other for the transmission of freight and mail matter, no particular surprise was occasioned. Indeed, this feat is far less wonderful than the fact that the human voice can be carried the same distance instantly. Probably no one industry in the world is employing so much labor and capital to-day as electrical development. The question is often asked, What is to be the future of all this development, and what results will be reached during the next half century if the present march of progress continues? That is probably a question that the most visionary enthusiast would be unable to correctly answer. The electric fluid possesses almost immeasurable rapidity; its heat is the most intense known to science, and one only has to witness the result of a lightning stroke to be convinced of its limitless power. But how to produce and control this terrible agent to the best advantage is the still unsolved problem. It is an indisputable fact that notwithstanding the great progress which has been made in electrical science, there is no current obtainable for light and power that does not trace its origin to the steam engine. The transforming of coal and water into electrical energy must, according to the laws of nature, be accompanied with loss, and electricity thus produced is expensive, and in many cases entails serious objections. For street lighting, house lighting, and in many instances for the transmission of power, the present systems are well enough. Yet they are the children of steam, and, being children, cannot yet achieve the deeds of their powerful parent. The energy is there, nevertheless, but man's skill has never yet been able to produce it. The dream of every enthusiastic electrician is to see the steam engine relegated to its place beside the stage coach, and electricity, silent, powerful, rapid, the motive power of the world. Since the days when the primary battery was discovered, no substance has ever taken the place of zinc as the positive pole, and this metal is used to-day in all generating batteries even of the most improved pattern. The chemical destruction of zinc causes galvanic electricity, which would be as useful as dynamic could a sufficient volume and intensity be obtained. But the cost of zinc is too great to obtain the desired results. Some day a lucky mind will blunder on to a substance as cheap as petroleum and as common as salt, that can throw off electricity in immense volumes at a rapid rate at a nominal cost. When that day comes the coal will slumber in the mine, the furnace fires will be banked forever and enlightened man will hold up the steam engine as one of the makeshifts of the nineteenth century.

### The Increase of Central Stations.

The indications of a growing demand for the electric light are particularly evident in the Westinghouse central station department. A REVIEW representative learned from General Manager Byllesby, of the Westinghouse Electric Company, on Saturday last, that the total output of lamps for the month of July amounted to the large number of 28,600, distributed as follows:

Johnstown, N. Y., 500; St. Joseph, Mo., 750 increase; Media, Pa., 1,000; Charlotte, Mich., 750; Coopers Sta., W. Va., 750; Arkansas City, Kan., 750; Pt. Pleasant, W. Va., 500; Dennison, O., 500; Mauch Chunk, Pa., 1,500; New York, N. Y., 12,000 increase; Pittsburgh, Pa., 3,000 increase; Wilmington, Del., 750; Little Falls, Minn., 500; Moscow, Idaho, 500; New London, Ct., 750 increase; Clearfield, Pa., 500; Penn Yan, N. Y., 750; Sherman, Tex., 750; Downingtown, Pa., 500 increase; Aurora, Ills., 100 increase, due to exchange; Dubois, Pa., 1,000; Sumter, S. C., 500. Total, 28,600. The same company also received during the month of July orders for arc lighting apparatus as follows: Little Falls, Minn., 35 lights; Colfax, W. T., 35 lights; McKeesport, Pa., 35 lights; Bay City, Mich., 70 lights; Petaluma, Cal., 35 lights; Mauch Chunk, Pa., 50 lights; Sumter, S. C., 35 lights. Total, 295.

These are pretty fair times for manufacturers of electric lighting apparatus.

—— Craig R. Arnold & Company, manufacturers of steam frictional dynamos for marine purposes, have just completed an electric light plant which will be placed in the yacht "Restless," chartered by Postmaster-General John Wanamaker recently. The steam dynamo and engine combined take up a space two feet square. It is a 60-light machine, and has a six horse-power engine. No belts are used on the engine or dynamo, as the power is transmitted by paper pulleys, operated by friction. There are no cross head, piston rod or stuffing boxes attached to the engine, and the dynamo and engine are mounted on one bed plate. This plant, small as it may appear to be, will run three search lights of 8,000 candle-power, or 60 incandescent lamps, 16 candle-power each. Recently the firm gave an exhibition of their search light, from the top of the old *Republican* building on Market street, and the buildings over in Jersey were lighted up almost as clear as day, so powerful proved the light. The search light is a valuable assistance to mariners, for, by its use, they can navigate streams at night with the same safety as navigating by day.

—— The Westinghouse Company before next December will probably have a 25-candle power incandescent light on every lamp post in the great fashionable quarter known as the Northwest section in Washington, where all the millionaires, Senators, foreign ministers and swell clubmen most do congregate. The engineer commissioner of the district recommended that a contract be entered with the company, according to the terms proposed by the latter, to light all that section between K and Boundary streets and First street and Georgetown. The price to be paid is $18 per light per annum, which is the same as gas. The company proposes also to introduce lights in private residences at the present cost of gas. The success of the company is due to the energetic work of Jas. Atwell, of Pittsburgh, who has presented the matter to the commisioners and leading citizens of the district. Work on the laying of the subterranean cables will be begun at once. The members of the company are still citizens of Pittsburgh. Mr. C. H. Jackson is the president, and among the directors are James M. Guffey, George M. Wilson, James S. Humbert, P. Foley and James Atwell.

### The Poet's View of the Dynamo as an Executioner.

[Written for the ELECTRICAL REVIEW.]

How doth the little dynamo
Improve its spinning coil,
By gathering volts and amperes up,
The murderer's head to spoil!

How merrily it seems to sing!
How bright its glittering spark!
Its joyous note is like a knell
To him whose ways are dark.

How quickly turns its armature,
Revolving in the "field."
The murderer's lot's a hapless one
'Less Cockran him can shield.

July 30, '89. F. C. SCHNEIDER.

—— The Julien Electric Car Company will install a storage battery plant in Indianapolis, and run a number of its cars on Illinois street, the city council of Indianapolis having granted the right.

—— An electrical street railway company has been organized at Grand Forks, Minn., and will build a road as soon as possible. John L. Lewis is one of the projectors of the scheme, and is aided by local capitalists.

—— The Oakland, Cal., Electric Light and Motor Company has erected an iron tower 100 feet high, at the junction of San Pablo avenue and Broadway, having five arc lamps, to demonstrate the efficiency of its system for street lighting to the city.

—— The Niagara Falls & Suspension Bridge Street Railway Company have decided to adopt electricity as the motive power of their line. They will apply to the Supreme Court for the appointment of three commissioners to examine into their wish, and their report can be accepted in line of obtaining the consent of one-half of the property owners along the line, as the law compels.

—— The New York Life Building at Kansas City was lighted by electricity last week for the first time, the new Brush incandescent electric light plant being given its first test. The plant consists of six machines run by a 350 horse-power Corliss engine. There are 2,400 lights in the building, and they illuminated the immense structure brilliantly. Mr. C. C. Gartland had charge of the installation for the Brush Company.

—— It is stated that the Thomson-Houston Electric Company has purchased all the machinery, merchandise, patents, etc., pertaining to, or controlled by, the Van Depoele Electrical Manufacturing Company, Chicago, and will transfer the same to its factory at Lynn, Mass., or make such other disposition as may seem best. The Van Depoele Company will continue to transact its business for the present, will fill all orders received, carry out all contracts made and settle all accounts.

—— The work of repairing and building at Gibson Electric Works, Chatham, N. Y., is progressing as rapidly as possible. One dynamo is running every day and at times three machines are in operation. A recent shipment of storage batteries went to New York and were used on an experimental trip on a Broadway street car which was run successfully by an electric motor. The car was also lighted from the same battery. Some of the way where the track was clear the car was propelled at the rate of 15 miles per hour.

—— Mr. Blodgett, superintendent of electrical construction on the Boston and Albany railroad, hopes to have the new lighting plant for the depot ready for use this week. Two Westinghouse engines of 60 horse-power each have been put up in the station, with the clutch system on the connecting shafting. Two Edison dynamos, each capable of supplying 500 incandescent lamps of 16 candle power will be used with one Brush dynamo for arc lamps. The lighting plant for the present will include about 16 arc lights, while the incandescent lamps will be equivalent to 600 of 16 candle power each, although a number of them will be of 24 and 50 candle power.

## ELECTRIC LIGHT NEWS

—— Omaha is fighting over the question of renewing its contract for city lighting with the gas company. Many of the citizens want the electric light instead.

—— Mr. E. E. Mandeville will hereafter act as local manager of the Kearney Electric Company, Kearney, Neb., and will be in charge of the entire system of electric lighting.

—— The Bridgeton Electric Light Company, Philadelphia, Pa., will put in a 120 horse-power engine and a 150 horse-power boiler. About 300 of the lights have been subscribed for.

—— The Media Electric Light Company, Media, Pa., has awarded to Joseph Seal, of that place, the contract for the erection of the company's buildings, work on which will be begun at an early date.

—— The Duquesne Electric Railway Construction Company, Duquesne, Pa., elected W. J. Hammond, president; J. V. Patton, vice-president; W. J. Hammond, Jr., treasurer; W. J. Mc Elroy, secretary and general manager.

—— A Vermont electric company have just put into the Amoskeag mill at Manchester, N. H., an incandescent plant of 500 lights. They have also secured the contract for furnishing a woollen mill in Lewiston, Me., with a plant of 600 lights.

—— The Somerville Electric Light Company, Somerville, Mass., has put in a new 150 horse-power boiler. A 200 horse-power engine has been ordered that will drive four dynamos. They now have a boiler capacity of 500 horse-power and with the new engine will have have a like amount of engine power.

—— The United Gas Improvement Company, of Philadelphia, has purchased the Heisler Electric Light Company, of St. Louis, and will enter actively into the electric field. The name of Heisler will be retained, and company's office will be in the Drexel Building, Philadelphia, and No. 10 Wall street, N. Y.

—— The electric light company at Atchison, Kas., expects to expend $15,000 in Atchison before cold weather. The proposed incandescent system will cost $10,000, and the new city street lights will cause an expenditure of $5,000. Work will be commenced as soon as the contract for the city lights is signed by Mayor Waggener.

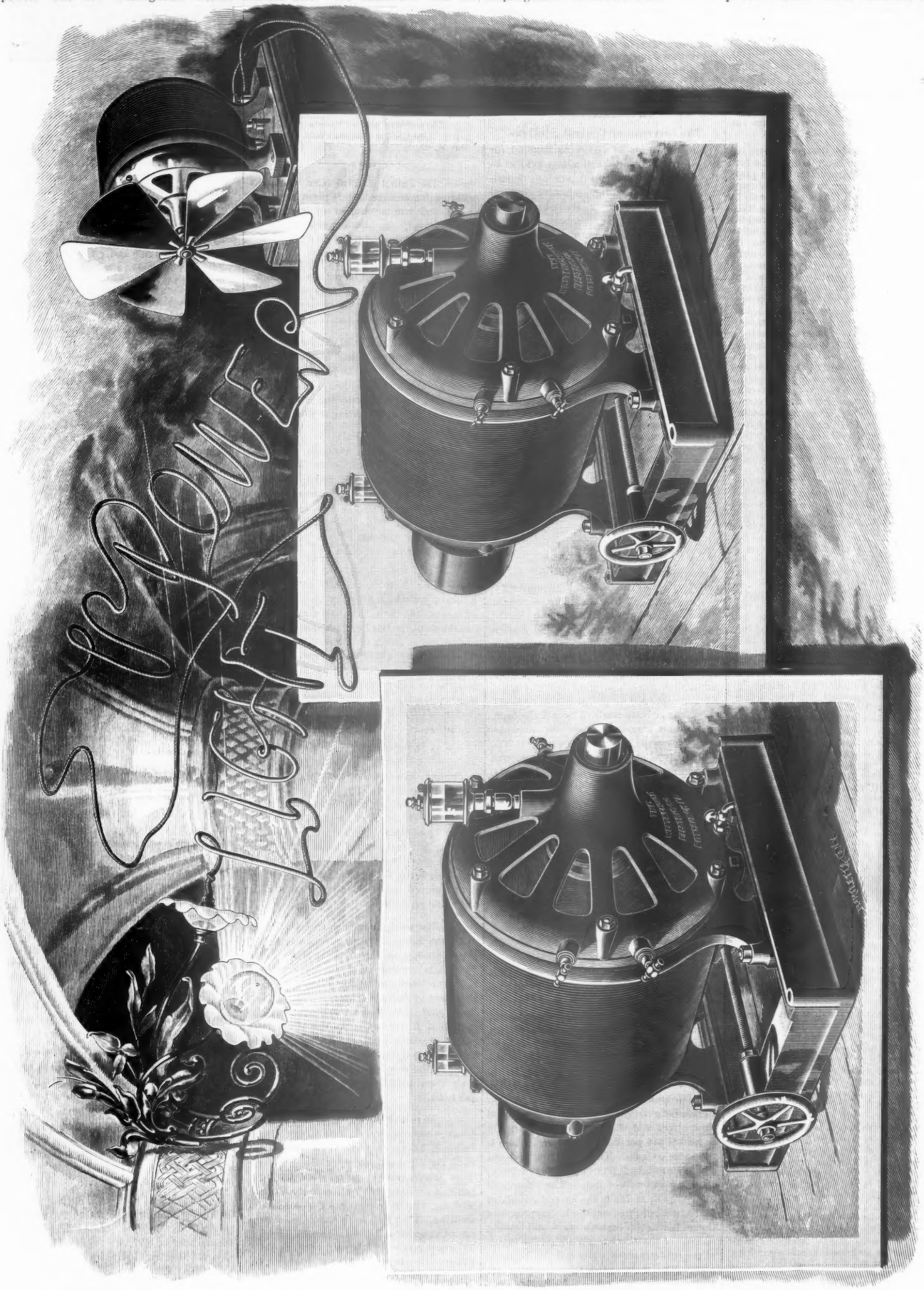
—— The Thomson-Houston Company, Boston, Mass., are negotiating for the Rogers & Sheldon mill privileges, as they can then furnish light and power by water. It is said that the property could be purchased for $5,000 and considerable of the purchase money could be turned back into stock. It is thought that definite plans will be made at an early date.

—— The electric current was turned on the wires of the Idaho Electric Supply Company, at Hailey, Idaho, a few days ago, for the first time since the fire. As very extensive repairs, including many poles, several miles of new wire, and many connections were rendered necessary by that disaster, the company officials watched the result with some anxiety. Everything worked smoothly, without a hitch.

—— President W. A. Styles, of the Middleboro Electric Light and Power Company, New Bedford, Mass., has made a formal offer of $17,000 to the Middleboro Gas and Electric Company for their plant and titles. The latter company has made no reply as yet to the proposition, but it is generally regarded as the easiest way to settle the case carried before the gas commissioners in May, and on which they have made no decision.

**The Westinghouse Motor.**

In this issue is presented a large and interesting picture representing light and power. The new Westinghouse electric motor is shown running a fan, the same current that furnish the power also supplying incandescent light. Beneath appear two larger views of the motor. The alternating current motor has been described at length in these columns and does not need further mention here. We understand that the Westinghouse Electric Company is arranging for its introduction on a large scale, both for stationary and railroad work. On account of the fact that no sparking is possible with these motors, no commutator being used, the mines where gasses accumulate are adopting them with much success.



VIEWS OF THE WESTINGHOUSE ALTERNATING CURRENT MOTOR.

* * The City Electric Company, Wilmington, Del., is placing poles on the east side for the electric lights recently contracted for.

* * The mayor of Milwaukee, the city engineer, and aldermen Ramsey, Obenberger, Bechtner, Steinman, McCoy, Altpeter and Grant form a committee of that city to look into the electric road at Boston with a view to adopting a system for Milwaukee.

**The Butler Hard Rubber Co.**—This well known and long established house is now manufacturing in large quantities hard rubber battery cells, under Kiel's patents, which are meeting with a most generous reception from storage and primary battery manufacturers. The durability and insulating properties of this cell are most highly commended by the users, and yet the company, under improved methods of manufacture, are enabled to make the claim that it is the "cheapest in the market." The fine work done by this house in the past in the line of hard rubber goods is well known to all users of such supplies, and is a guarantee of the excellent work that will be done by them now that they have more actively entered into the manufacture of hard rubber electrical supplies.

**The Denver Consolidated Electric Co.** have placed an order for two 200 h. p. Westinghouse automatic compound engines. Some four months ago, they contracted with Fairbanks & Co., of St. Louis, Mo. (agents for the Westinghouse Machine Co.), for a Westinghouse compound engine of 125 h. p., which engine Fairbanks & Co. guaranteed would show a water consumption not to exceed 25 pounds per indicated h. p. per hour. The engine was duly shipped, and after being set up and run a short time, a test was made, in order to ascertain the fuel economy. The test showed the water consumption to be less than 23 pounds per indicated h.p. per hour. On this showing, the Denver Consolidated Electric Co. awarded the contract for their additional steam power to Fairbanks & Co., for two 200 h. p. Westinghouse compound engines, as before stated.

**The Chicago Office of Westinghouse, Church, Kerr & Co.** have made a remarkable showing in the line of economy, at the Aurora Electric Light and Power Co., Aurora, Ill. The original plant of this company consisted of a horizontal return tubular boiler with a good automatic engine, heater, etc., burning the best quality of lump coal, which was found to be necessary under the conditions, at an average cost of from four to five dollars per night. This plant was replaced by a Hazelton boiler, fired by two Roney mechanical stokers, and a Westinghouse compound condensing engine. The company immediately went to buying the cheapest quality of slack coal, with an enormous reduction in the quantity burned. The net result, running exactly the same number of lights and for the same time, was a reduction of from $4.50 per night to 90 cents per night. The Aurora Company add in their letter to Westinghouse, Church, Kerr & Co.: "The pipe is not yet covered." This may be regarded as unfortunate, but they further say: "Should any of your friends or parties interested in electric lighting apparatus wish to verify these statements, we will take pleasure in showing them the entire working of the apparatus."

The city of Bangor has contracted with the Jarvis Engineering Company to put in an engine and boilers at the Bangor water works to furnish power for the city's electric street lights should the occasion at any time arise when the water power should prove insufficient. The engine will be of 150 horse power, manufactured by Armington & Sims, and of high speed. The boilers, two in number, are to be made at the Penobscot River Steam Boiler Works, this city, and are to be each six feet in diameter by 17 feet long, and will have 138 tubes three inches in diameter. The engine and boilers are to be put in during August.

Just one thing seems to be certain about the much-talked-of electric current, and that is that it is a mighty uncertain thing to execute criminals with.

## Mr. Park Benjamin on Death by Electricity.

In the New York *Herald* of recent date, Mr. Park Benjamin, the well known electrical engineer and author of "The Age of Electricity," writes as follows on the question of electrical execution, and while some of his points may not be endorsed by many electricians, they are of such interest at this time that we deem them worthy of publication:

The principal outcome of the electrical execution inquiry so far seems to show that A, having an electric lighting system depending on the use of the direct current, is exceedingly willing that criminals should be killed by means of the alternating current on which the system of B, A's business rival, is based. B, on the other hand, however, naturally objects to having his apparatus classed in the public mind with the implements of the executioner. Testimony mainly embodying the adverse views of A and B is, in some way which is not clear, supposed to conduce to a test of the constitutionality of the law providing for electrical execution.

The issue between A and B, which has thus been dragged in for advertising purposes, if not a public scandal, is at least a matter of public indifference. What this community wants to know is whether electricity will kill criminals certainly and painlessly, and if so by what appliance.

On this point I venture to ask space for a few words, because I believe I was the first publicly to propose the change in the law, which I have advocated for some 16 years, and through your kind courtesy I was permitted to maintain the affirmative side in quite a protracted controversy on the subject in the columns of the *Herald* some 10 years ago.

People are frequently struck by lightning and killed. They are often found in positions which prove instantaneous death. By "instantaneous death" is meant death which occurs before the brain can recognize the destroying agency.

Perception requires time, about one-fiftieth of a second. The lightning discharge is delivered in considerably less than one hundred thousandth of a second. Therefore a person is killed by it so quickly that literally he never knows what hurts him. Death thus caused, therefore, is clearly not cruel in the sense of being painful. It is not unusual in the sense of being unknown. It was more common before the days of lightning rods than it is now.

Lightning is electricity under enormous pressure. Sometimes, though not always, it has considerable volume. Electricity is not deadly by reason of its pressure alone, but by reason of both pressure and volume. There has been a great deal of loose talk during the present inquiry about volts and voltage. A volt is the unit of pressure.

The nervous shock of a discharge at high voltage may be as harmless as that attending a kiss. The simple expedient of rubbing the soles of the feet on the carpet during cold weather and touching a gas fixture, will produce a discharge of exceedingly high pressure, probably far above that given by any dynamo, and yet be perfectly innocuous. On the other hand, a current of very much lower pressure, but with considerable volume, may be certainly deadly. A snipe-shot from a fowling piece striking the person may not penetrate the skin. Enlarge the shot to the size of a bullet, the velocity still remaining the same, and it will kill. Increase it to the size of a cannon ball and heavy armor plating is required to resist it. The tremendous shock of a lightning discharge is far in excess of that due to the cannon ball. The question is, can we reproduce artificially something akin to that shock?

The way to do this was pointed out by Benjamin Franklin, 138 years ago. Here are his own words, from one of his letters to Collinson:

"There are no bounds, but what experience and labor give, to the force man may raise and use in the electrical way; for bottle may be added to bottle in *infinitum*, and when united and discharged together as one, the force and effect proportioned to their number and size, the greatest known effects of common lightning may, I think, without much difficulty be exceeded in this way."

This was written five years after the discovery of the possibility of accumulating electricity in the Leyden jar—that wonderful "bottle," which Collinson sent to Franklin and with which Franklin began the series of experiments which culminated in the magnificent demonstration of the identity of lightning and electricity.

During these five years tests innumerable of the lethal effect of the accumulated discharge had been made; the philosophers of Europe, in fact, had been doing little else toward the study of electricity.

Birds and fishes had been killed by it. Franklin himself had proposed an electrical feast in which the turkey was thus to be executed. Nollet had given tremendous shocks simultaneously to a whole company of the French King's guard, and afterward to all the monks of a Carthusian convent in one fell swoop.

One philosopher had offered himself as a victim, so that "the account of his death might furnish an article for the French Academy of Sciences." There was great public excitement on the subject.

Franklin's letter was written in the midst of this, one year before his famous kite experiment and two years before the Russian, Richmann, was killed by the lightning which he himself had brought down, but for which he had forgotten to provide a path to the earth.

Franklin refers to the connection of Leyden jars together, so as to form a battery. It is well known that by such an arrangement a discharge of great volume and of intense pressure can be obtained, and that the charging of the jars by an ordinary static electrical machine is a matter of no difficulty.

Now as to the proof of the sensations attending the reception of such a discharge. It is a singular fact that two of the greatest electrical experimenters that the world has known both received it accidentally, and one of them has recorded his sensations in unmistakable terms. Faraday, while lecturing, received the discharge of a large battery, and his biographer says he was stunned and "rendered hysterical" by it, and was able to continue his discourse.

Tyndall also, while lecturing, accidentally touched the terminals of a battery of 15 large Leyden jars, and the discharge went through his body. He says: "Life was absolutely blotted out for a very sensible interval without a trace of pain. In a second or so consciousness returned."

"What I wish chiefly to dwell on here," he adds, "is the absolute painlessness of the shock; and there cannot be a doubt that to a person struck dead by lightning the passage from life to death occurs without consciousness being in the least degree implicated. It is an abrupt stoppage of sensation unaccompanied by a pang."

It may readily be imagined that if that battery had been larger the career of the distinguished scientist might have ended on that platform.

The law does not provide that criminals shall be executed by any particular kind of current, but by electricity. It is difficult to perceive how the law can be regarded as unconstitutional until it be shown that death by electricity cannot be caused except under conditions which bring its use under constitutional prohibition.

The present inquiry does not seem to have extended beyond a consideration of the slow dynamo current produced in one form or the other. And even as to this, wide divergence of opinion, partial and impartial, has been made manifest.

It has been shown that people who have received the current from electric light wires and lived have been terribly burned and mutilated. Such persons have described to me their sensations as most horrible, likening them to the agony which might be produced by red hot needles burrowing into nerve pulp. It is also shown that men and brutes have been repeatedly killed by such a current.

But there is no proof of painless death. Dumb animals cannot tell their sensations, and a man might be rendered incapable of showing the torture which kills him. A few seconds of such agony is an eternity.

There is no question but that a man can be killed by the dynamo current, and equally there is none but that he can be slowly squeezed to death in a hydraulic press. The law is satisfied by causing death, and hanging accomplishes that end already. The present object is not merely to kill, but to do so instantly and painlessly. That the dynamo current is competent to do this is most certainly a matter of doubt, and of that doubt any human being is entitled to the benefit.

The State has not tested nor taken any steps to test in any adequate way all possible modes of electrical destruction.

In common, with others better qualified than I am to judge, I believe that we should imitate the terrific shock of the lightning discharge and not shake the criminal asunder by the rapid pulsations of the alternating current, nor burn him up by the slow decomposition produced by the direct current.

The State has acted negligently and precipitately. It should create a proper commission of scientists of known reputation, charged with a practical examination within a reasonable and limited time of all means of electrical execution, and in the report of that commission an argument on the constitutionality of the law might find some adequate basis.

In the meantime the condemned man should not be killed by the claptrap contrivances now at hand in Auburn, nor should the most solemn act which society can perform be prostituted to the purpose of a business advertisement.

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JULY 30, 1889.

407,761 407,762 407,763 Calelectric generator; Edward G. Acheson, Pittsburgh, Pa.

407,781 Galvanic battery; William P. Kookogey, Brooklyn, assignor to the Kookogey Electric Company of New York, N. Y.

407,799 Telephone; John Trowbridge and Samuel Sheldrick, Cambridge, Mass.

407,801 Mechanical organ; Edwin S. Votey, Detroit, Mich.

407,844 Alternating current electric motor; Elihu Thomson, Lynn, Mass.

407,875 Alternating current dynamo; Gustav Pfannkuche, Cleveland, Ohio, assignor to the Brush Electric Company, same place.

407,895 Electric lighting system; Frank E. Kinsman, Plainfield, N. J.

407,896 407,938 Insulating compound; Frank Marquard, New York, N. Y.

407,914 Electric projector. 407,915 Focusing arc lamps; James J. Wood, Brooklyn, N. Y.

407,931 Galvanic battery; Charles J. Hirlimann, Fort Lee, N. J.

407,945 Electric clock for use in exposed places; Alfred Speer, Passaic, N. J.

407,973 Electric lamp support; Albert T. Thompson, Boston, Mass., assignor to Albert T. Thompson & Co., same place.

408,002 Secondary battery; Victor H. Ernst, Jersey City, N. J.

408,016 408,017 Electric meter. 408,018 Electrical indicator; Edward R. Knowles, Brooklyn, N. Y.

408,042 Electric signal box; Don A. Palmer, Englewood, assignor of one-half to Bernard E. Sunny, Chicago, Ill.

408,045 Protecting case for armatures; Andrew L. Rice, New York, N. Y.

408,112 Means for measuring and regulating the charge and discharge of secondary batteries; William P. Kookogey, Brooklyn, N. Y.

408,130 Non-magnetic alloy; Hermann Ostermann and Charles Lacroix, Geneva, Switzerland, assignors to the Usine Genevoise de Degrossissage d'Or, same place.

408,151 Electric eyeglasses; Hermann Welcker, Berlin, Germany.

408,157 Electric measuring instrument; John A. Barrett, Brooklyn, N. Y., assignor to the John A. Barrett Battery Company, Baltimore, Md.

408,182 Alloy for secondary battery plates; Edward R. Knowles, Brooklyn, N. Y., assignor, by mesne assignments, to the Mutual Electric Manufacturing Company of New York.

408,194 Electric switch; Harry T. Riggs, Farmington, Me., assignor of one-half to Alvin S. Riggs, same place.

It is stated that the manufacture of welding machines for the Thomson European Welding Co. will not be done in Lynn, but the company will at once establish factories in each of five countries in Europe in which to manufacture the machines. It is necessary to do this in order to hold the patents in those countries. Several machines are now being built at West Lynn for foreign shipment, and two or three machines already are doing work in England and France. Immediate steps will be taken to organize and start the foreign factories, and it is expected they will be in operation within the next 90 days.

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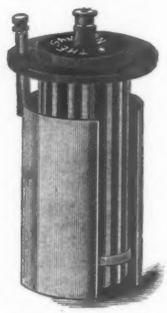

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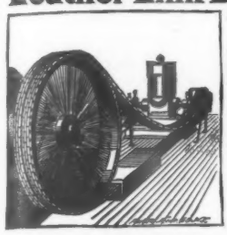

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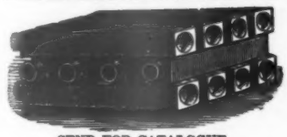

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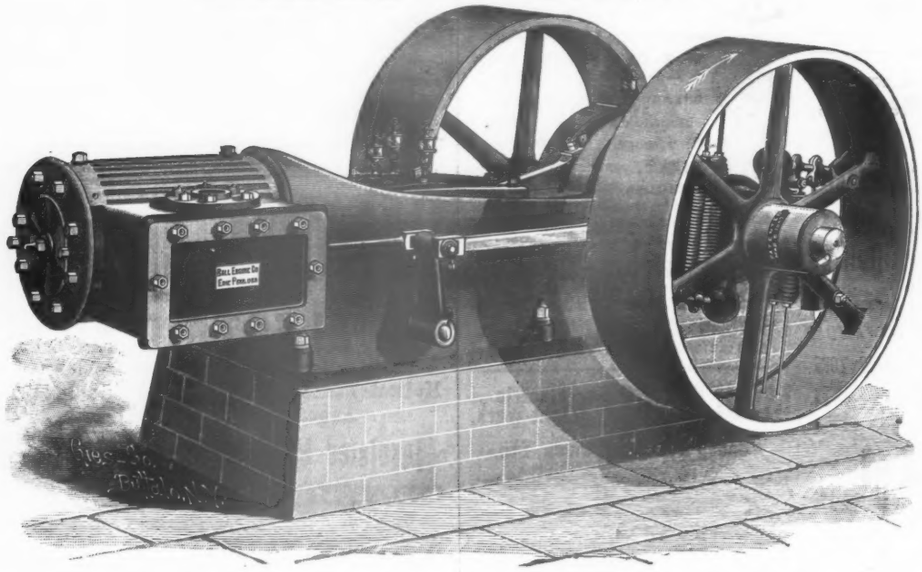

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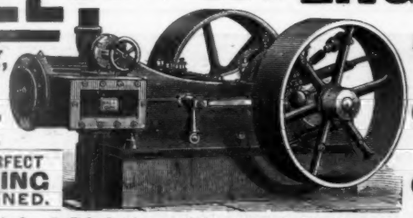

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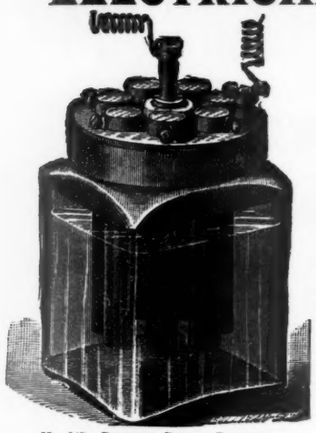

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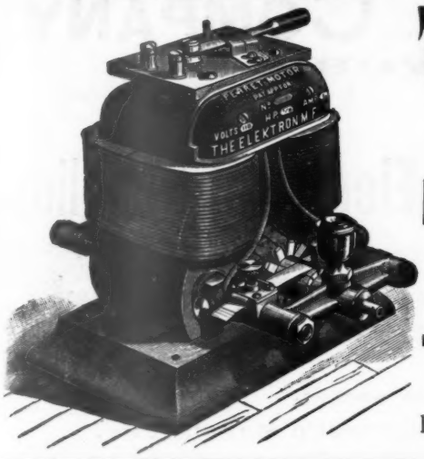


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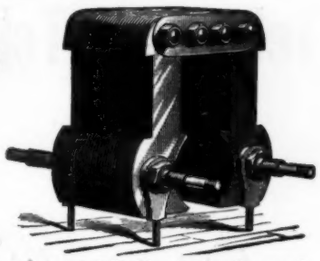

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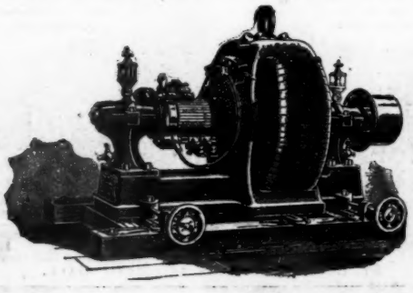

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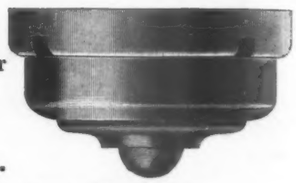

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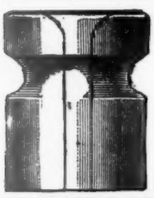

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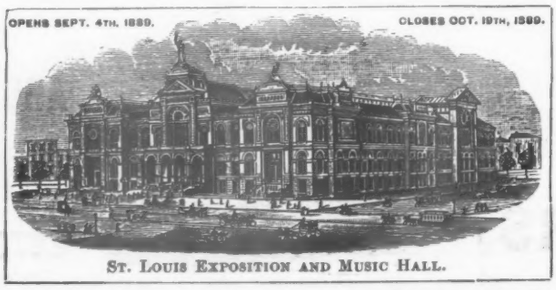


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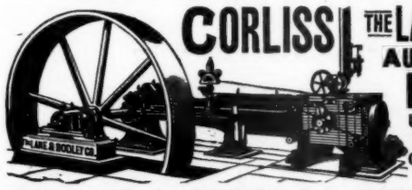
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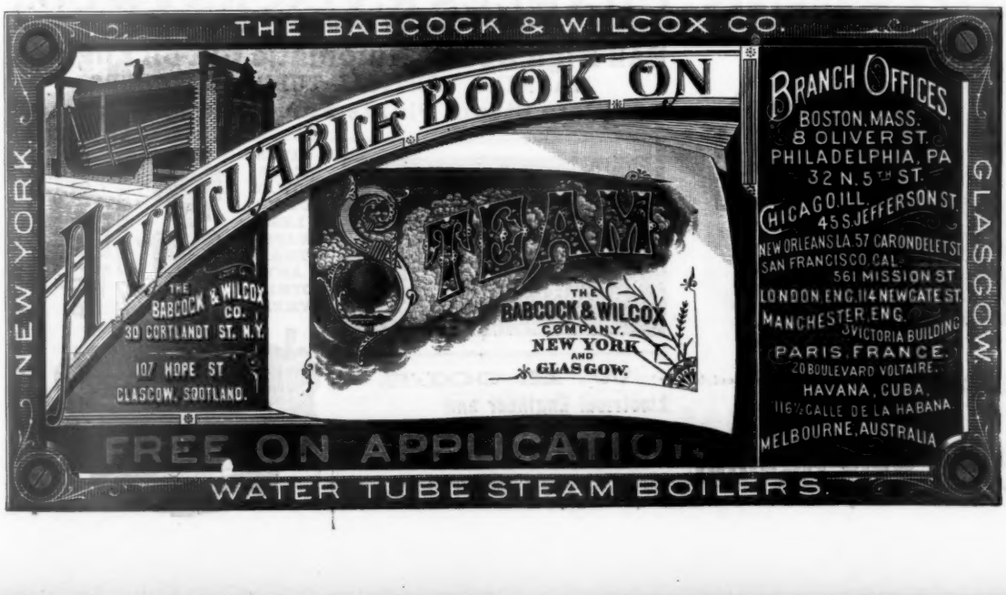
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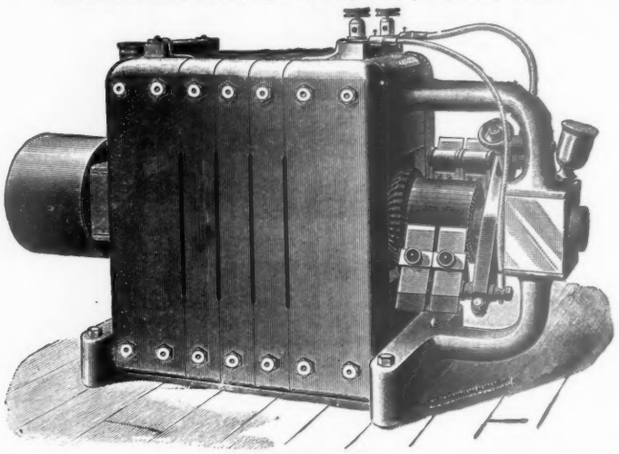

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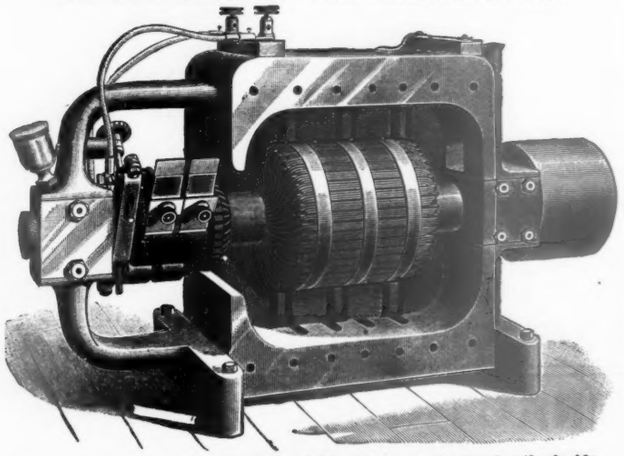

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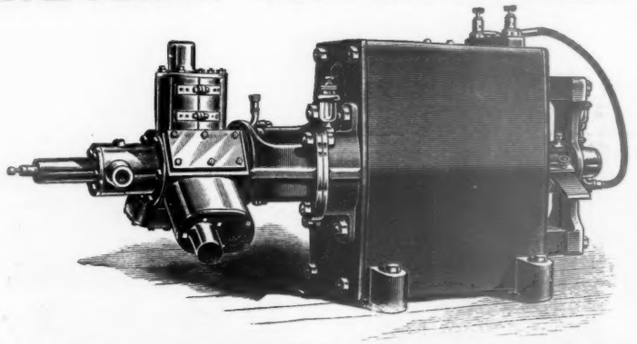

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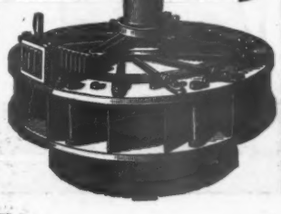

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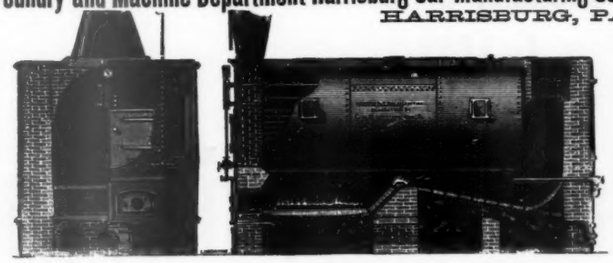

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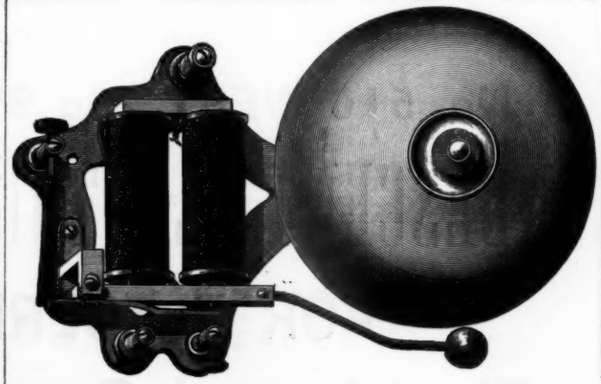

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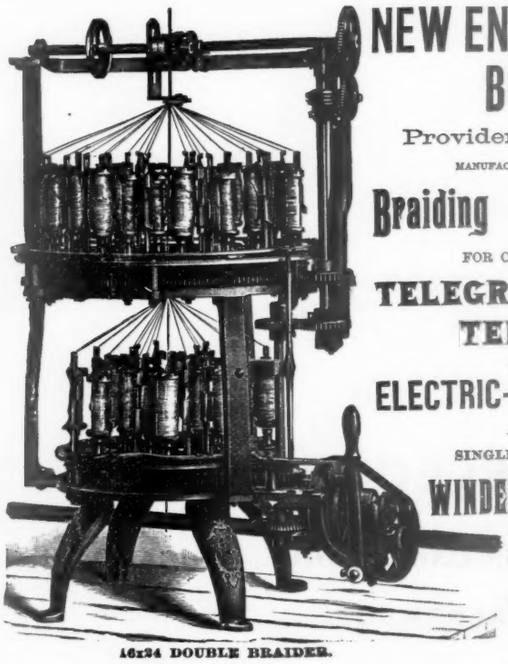

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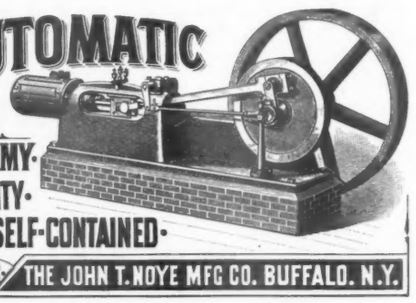

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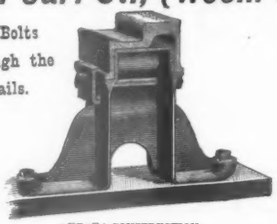

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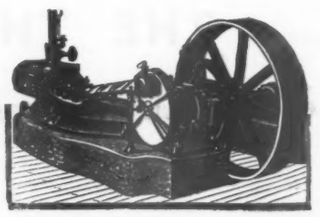

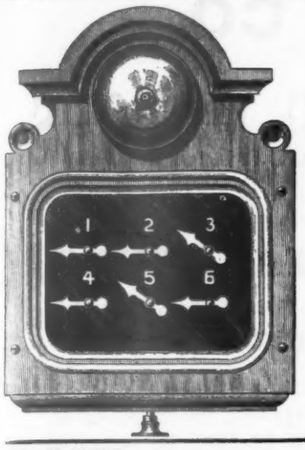


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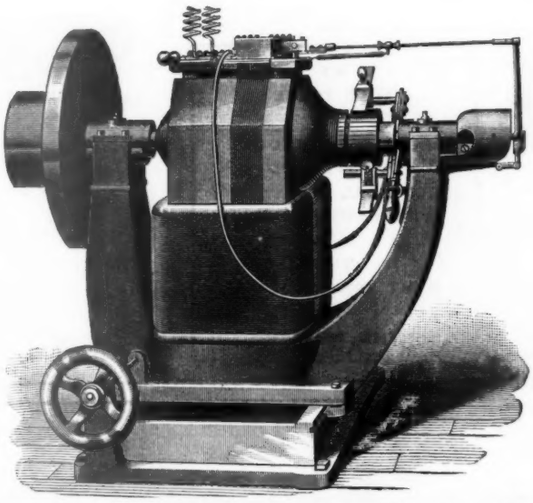

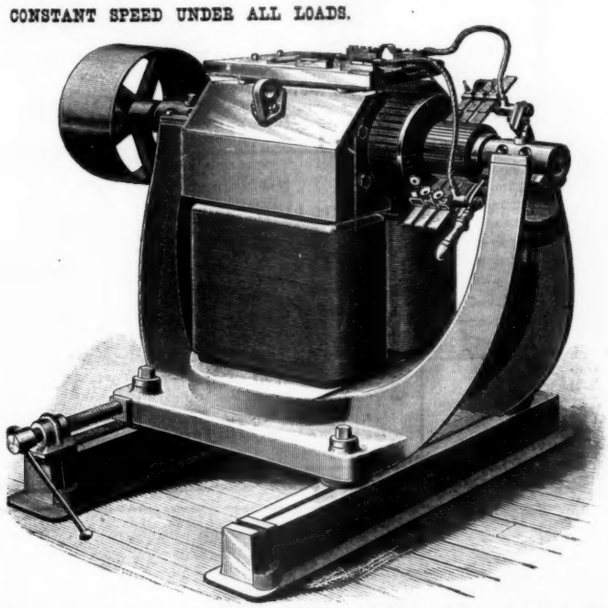

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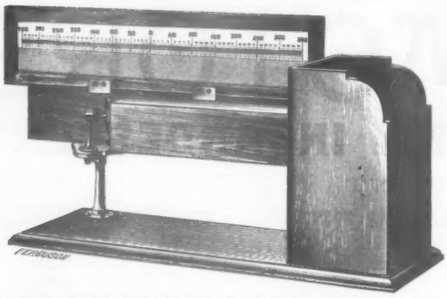

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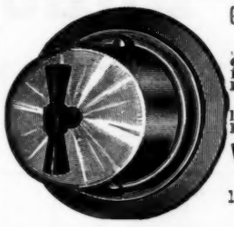

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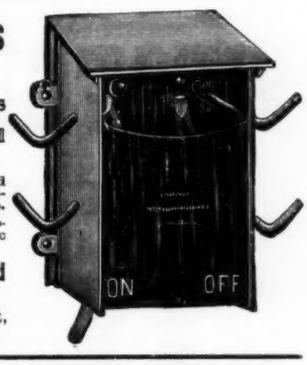


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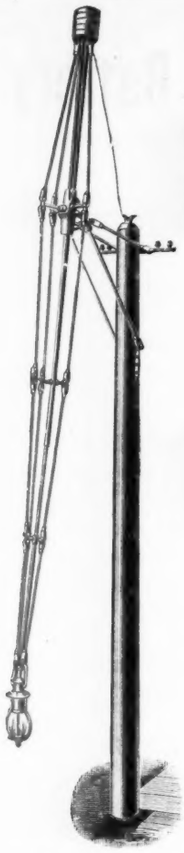

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